

Paper Copy Sequence Listing 15414A_v4.ST25.txt
SEQUENCE LISTING

10/525318

<110> Monsanto Technology LLC

Romano, Charles P

Bogdanova, Natalia N

<120> Nucleotide Sequences Encoding Cry1Bb Proteins for Enhanced Expression in
Plants

<130> 38-21(15414)

<150> 60/407,428

<151> 2002-08-29

<160> 14

<170> PatentIn version 3.1

<210> 1

<211> 3687

<212> DNA

<213> Bacillus thuringiensis

<220>

<221> CDS

<222> (1)..(3687)

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<222> (1)..(864)

<223> sequence encoding toxin domain I

<220>

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<223> sequence encoding toxin domain II

<220>

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<222> (1489)..(1929)

<223> sequence encoding toxin domain III

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<223> sequence encoding protoxin domain

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att cca acg gta tcg aat cct tcc acg caa atg aat cta tca cca gat 96
ile pro thr val ser asn pro ser thr gln met asn leu ser pro asp
20 25 30

gct cgt att gaa gat agc ttg tgt gta gcc gag gtg aac aat att gat 144
Ala Arg Ile Glu Asp Ser Leu Cys Val Ala Glu Val Asn Asn Ile Asp
35 40 45

cca ttt gtt agc gca tca aca gtc caa acg ggt ata aac ata gct ggt 192
Pro Phe Val Ser Ala Ser Thr Val Gln Thr Gly Ile Asn Ile Ala Gly

aga ata ttg ggc gta tta ggt gtg ccg ttt gct gga caa cta gct agt 240
Arg Ile Leu Gly Val Leu Gly Val Pro Phe Ala Gly Gln Leu Ala Ser
65 70 75 80

ttt tat agt ttt ctt gtt ggg gaa tta tgg cct agt ggc aga gat cca 288
 Phe Tyr Ser Phe Leu Val Gly Glu Leu Trp Pro Ser Gly Arg Asp Pro
 85 90 95

tgg gaa att ttc ctg gaa cat gta gaa caa ctt ata aga caa caa gta 336
 Trp Glu Ile Phe Leu Glu His Val Glu Gln Leu Ile Arg Gln Gln Val
 100 105 110

aca gaa aat act agg aat acg gct att gct cga tta gaa ggt cta gga 384
Thr Glu Asn Thr Arg Asn Thr Ala Ile Ala Arg Leu Glu Gly Leu Gly

aga ggc tat aga tct tac cag cag gct ctt gaa act tgg tta gat aac 432
Arg Gly Tyr Arg Ser Tyr Gln Gln Ala Leu Glu Thr Trp Leu Asp Asn
130 135 140

cga aat gat gca aga tca aga agc att att ctt gag cgc tat gtt gct 480
Arg Asn Asp Ala Arg Ser Arg Ser Ile Ile Leu Glu Arg Tyr Val Ala

145	Paper Copy Sequence Listing 15414A_v4.ST25.txt	155	160
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cta tta tta ttg aga gac gca tcc ctt ttt ggt agt gaa tgg ggg atg Leu Leu Leu Leu Arg Asp Ala Ser Leu Phe Gly Ser Glu Trp Gly Met 195 200 205	624		
gca tct tcc gat gtt aac caa tat tac caa gaa caa atc aga tat aca Ala Ser Ser Asp Val Asn Gln Tyr Tyr Gln Glu Gln Ile Arg Tyr Thr 210 215 220	672		
gag gaa tat tct aac cat tgc gta caa tgg tat aat aca ggg cta aat Glu Glu Tyr Ser Asn His Cys Val Gln Trp Tyr Asn Thr Gly Leu Asn 225 230 235 240	720		
aac tta aga ggg aca aat gct gaa agt tgg ttg cgg tat aat caa ttc Asn Leu Arg Gly Thr Asn Ala Glu Ser Trp Leu Arg Tyr Asn Gln Phe 245 250 255	768		
cgt aga gac cta acg tta ggg gta tta gat tta gta gcc cta ttc cca Arg Arg Asp Leu Thr Leu Gly Val Leu Asp Leu Val Ala Leu Phe Pro 260 265 270	816		
agc tat gat act cgc act tat cca atc aat acg agt gct cag tta aca Ser Tyr Asp Thr Arg Thr Tyr Pro Ile Asn Thr Ser Ala Gln Leu Thr 275 280 285	864		
aga gaa att tat aca gat cca att ggg aga aca aat gca cct tca gga Arg Glu Ile Tyr Thr Asp Pro Ile Gly Arg Thr Asn Ala Pro Ser Gly 290 295 300	912		
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ata gag gct gcc att ttc agg cct ccg cat cta ctt gat ttt cca gaa Ile Glu Ala Ala Ile Phe Arg Pro Pro His Leu Leu Asp Phe Pro Glu 325 330 335	1008		
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aca tta aat acc tca aca caa gga ctt act aat aat act tca att aat Thr Leu Asn Thr Ser Thr Gln Gly Leu Thr Asn Asn Thr Ser Ile Asn 370 375 380	1152		
cct gta aca tta cag ttt acg tct cga gac gtt tat aga aca gaa tca Pro Val Thr Leu Gln Phe Thr Ser Arg Asp Val Tyr Arg Thr Glu Ser 385 390 395 400	1200		
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Val	Asn	Ala	Leu	Phe	Thr	Ser	Thr	Asn	Pro	Arg	Arg	Leu	Lys	Thr	Asp		
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aac ttc aca ttc atc agt ggg caa tta agt ttc gca tcc atc gat gga Asn Phe Thr Phe Ile Ser Gly Gln Leu Ser Phe Ala Ser Ile Asp Gly 725 730 735	2208
caa tca aac ttc ccc tct att aat gag cta tct gaa cat gga tgg tgg Gln Ser Asn Phe Pro Ser Ile Asn Glu Leu Ser Glu His Gly Trp Trp 740 745 750	2256
gga agt gcg aat gtt acc att cag gaa ggg aat gac gta ttt aaa gag Gly Ser Ala Asn Val Thr Ile Gln Glu Gly Asn Asp Val Phe Lys Glu 755 760 765	2304
aat tac gtc aca cta ccg ggt act ttt aat gag tgt tat cca aat tat Asn Tyr Val Thr Leu Pro Gly Thr Phe Asn Glu Cys Tyr Pro Asn Tyr 770 775 780	2352
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gct tta ttc gta gat tct caa tat gat caa tta caa gcg gat aca aac Ala Leu Phe Val Asp Ser Gln Tyr Asp Gln Leu Gln Ala Asp Thr Asn 965 970 975	2928
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1205

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3687

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<223> sequence encoding toxin domain III

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<223> sequence encoding protoxin domain

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Ala Arg Ile Glu Asp Ser Leu Cys Val Ala Glu Val Asn Asn Ile Asp
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Pro Phe Val Ser Ala Ser Thr Val Gln Thr Gly Ile Asn Ile Ala Gly
50 55 60

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Arg Ile Leu Gly Val Leu Gly Val Pro Phe Ala Gly Gln Leu Ala Ser
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Phe Tyr Ser Phe Leu Val Gly Glu Leu Trp Pro Ser Gly Arg Asp Pro
 85 90 95

Trp Glu Ile Phe Leu Glu His Val Glu Gln Leu Ile Arg Gln Gln Val
 100 105 110

Thr Glu Asn Thr Arg Asn Thr Ala Ile Ala Arg Leu Glu Gly Leu Gly
 115 120 125

Arg Gly Tyr Arg Ser Tyr Gln Gln Ala Leu Glu Thr Trp Leu Asp Asn
 130 135 140

Arg Asn Asp Ala Arg Ser Arg Ser Ile Ile Leu Glu Arg Tyr Val Ala
 145 150 155 160

Leu Glu Leu Asp Ile Thr Thr Ala Ile Pro Leu Phe Arg Ile Arg Asn
 165 170 175

Glu Glu Val Pro Leu Leu Met Val Tyr Ala Gln Ala Ala Asn Leu His
 180 185 190

Leu Leu Leu Leu Arg Asp Ala Ser Leu Phe Gly Ser Glu Trp Gly Met
 195 200 205

Ala Ser Ser Asp Val Asn Gln Tyr Tyr Gln Glu Gln Ile Arg Tyr Thr
 210 215 220

Glu Glu Tyr Ser Asn His Cys Val Gln Trp Tyr Asn Thr Gly Leu Asn
 225 230 235 240

Asn Leu Arg Gly Thr Asn Ala Glu Ser Trp Leu Arg Tyr Asn Gln Phe
 245 250 255

Arg Arg Asp Leu Thr Leu Gly Val Leu Asp Leu Val Ala Leu Phe Pro
 260 265 270

Ser Tyr Asp Thr Arg Thr Tyr Pro Ile Asn Thr Ser Ala Gln Leu Thr
 275 280 285

Arg Glu Ile Tyr Thr Asp Pro Ile Gly Arg Thr Asn Ala Pro Ser Gly
 290 295 300

Phe Ala Ser Thr Asn Trp Phe Asn Asn Asn Ala Pro Ser Phe Ser Ala
 305 310 315 320

Ile Glu Ala Ala Ile Phe Arg Pro Pro His Leu Leu Asp Phe Pro Glu
 325 330 335

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Gln Leu Thr Ile Tyr Ser Ala Ser Ser Arg Trp Ser Ser Thr Gln His
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 Met Asn Tyr Trp Val Gly His Arg Leu Asn Phe Arg Pro Ile Gly Gly
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 Thr Leu Asn Thr Ser Thr Gln Gly Leu Thr Asn Asn Thr Ser Ile Asn
 370 375 380
 Pro Val Thr Leu Gln Phe Thr Ser Arg Asp Val Tyr Arg Thr Glu Ser
 385 390 395 400
 Asn Ala Gly Thr Asn Ile Leu Phe Thr Thr Pro Val Asn Gly Val Pro
 405 410 415
 Trp Ala Arg Phe Asn Phe Ile Asn Pro Gln Asn Ile Tyr Glu Arg Gly
 420 425 430
 Ala Thr Thr Tyr Ser Gln Pro Tyr Gln Gly Val Gly Ile Gln Leu Phe
 435 440 445
 Asp Ser Glu Thr Glu Leu Pro Pro Glu Thr Thr Glu Arg Pro Asn Tyr
 450 455 460
 Glu Ser Tyr Ser His Arg Leu Ser His Ile Gly Leu Ile Ile Gly Asn
 465 470 475 480
 Thr Leu Arg Ala Pro Val Tyr Ser Trp Thr His Arg Ser Ala Asp Arg
 485 490 495
 Thr Asn Thr Ile Gly Pro Asn Arg Ile Thr Gln Ile Pro Leu Val Lys
 500 505 510
 Ala Leu Asn Leu His Ser Gly Val Thr Val Val Gly Gly Pro Gly Phe
 515 520 525
 Thr Gly Gly Asp Ile Leu Arg Arg Thr Asn Thr Gly Thr Phe Gly Asp
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 545 550 555 560
 Ile Arg Tyr Ala Ser Thr Thr Asp Leu Gln Phe Phe Thr Arg Ile Asn
 565 570 575
 Gly Thr Thr Val Asn Ile Gly Asn Phe Ser Arg Thr Met Asn Arg Gly
 580 585 590
 Asp Asn Leu Glu Tyr Arg Ser Phe Arg Thr Ala Gly Phe Ser Thr Pro
 595 600 605

Paper Copy Sequence Listing 15414A_v4.ST25.txt

Phe Asn Phe Leu Asn Ala Gln Ser Thr Phe Thr Leu Gly Ala Gln Ser
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 Phe Ser Asn Gln Glu Val Tyr Ile Asp Arg Val Glu Phe Val Pro Ala
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 Glu Val Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys Ala
 645 650 655
 Val Asn Ala Leu Phe Thr Ser Thr Asn Pro Arg Arg Leu Lys Thr Asp
 660 665 670
 Val Thr Asp Tyr His Ile Asp Gln Val Ser Asn Met Val Ala Cys Leu
 675 680 685
 Ser Asp Glu Phe Cys Leu Asp Glu Lys Arg Glu Leu Phe Glu Lys Val
 690 695 700
 Lys Tyr Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro
 705 710 715 720
 Asn Phe Thr Phe Ile Ser Gly Gln Leu Ser Phe Ala Ser Ile Asp Gly
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 Gln Ser Asn Phe Pro Ser Ile Asn Glu Leu Ser Glu His Gly Trp Trp
 740 745 750
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 755 760 765
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 770 775 780
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 785 790 795 800
 Gln Leu Arg Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu
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 Ile Arg Tyr Asn Ala Lys His Glu Thr Leu Asp Val Pro Gly Thr Asp
 820 825 830
 Ser Leu Trp Pro Leu Ser Val Glu Ser Pro Ile Gly Arg Cys Gly Glu
 835 840 845
 Pro Asn Arg Cys Ala Pro His Phe Glu Trp Asn Pro Asp Leu Asp Cys
 850 855 860
 Ser Cys Arg Asp Gly Glu Arg Cys Ala His His Ser His His Phe Thr

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865

870

875

880

Leu Asp Ile Asp Val Gly Cys Thr Asp Leu His Glu Asn Leu Gly Val
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Trp Val Val Phe Lys Ile Lys Thr Gln Glu Gly Tyr Ala Arg Leu Gly
900 905 910

Asn Leu Glu Phe Ile Glu Glu Lys Pro Leu Ile Gly Glu Ala Leu Ser
915 920 925

Arg Val Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Lys Leu
930 935 940

Gln Leu Glu Thr Lys Arg Val Tyr Thr Glu Ala Lys Glu Ala Val Asp
945 950 955 960

Ala Leu Phe Val Asp Ser Gln Tyr Asp Gln Leu Gln Ala Asp Thr Asn
965 970 975

Ile Gly Met Ile His Ala Ala Asp Lys Leu Val His Arg Ile Arg Glu
980 985 990

Ala Tyr Leu Ser Glu Leu Pro Val Ile Pro Gly Val Asn Ala Glu Ile
995 1000 1005

Phe Glu Glu Leu Glu Gly His Ile Ile Thr Ala Met Ser Leu Tyr
1010 1015 1020

Asp Ala Arg Asn Val Val Lys Asn Gly Asp Phe Asn Asn Gly Leu
1025 1030 1035

Thr Cys Trp Asn Val Lys Gly His Val Asp Val Gln Gln Ser His
1040 1045 1050

His Arg Ser Asp Leu Val Ile Pro Glu Trp Glu Ala Glu Val Ser
1055 1060 1065

Gln Ala Val Arg Val Cys Pro Gly Arg Gly Tyr Ile Leu Arg Val
1070 1075 1080

Thr Ala Tyr Lys Glu Gly Tyr Gly Glu Gly Cys Val Thr Ile His
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Glu Ile Glu Asn Asn Thr Asp Glu Leu Lys Phe Lys Asn Cys Glu
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Glu Glu Glu Val Tyr Pro Thr Asp Thr Gly Thr Cys Asn Asp Tyr
1115 1120 1125

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Thr Ala His Gln Gly Thr Ala Ala Cys Asn Ser Arg Asn Ala Gly
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Tyr Glu Asp Ala Tyr Glu Val Asp Thr Thr Ala Ser Val Asn Tyr
 1145 1150 1155

Lys Pro Thr Tyr Glu Glu Glu Thr Tyr Thr Asp Val Arg Arg Asp
 1160 1165 1170

Asn His Cys Glu Tyr Asp Arg Gly Tyr Val Asn Tyr Pro Pro Val
 1175 1180 1185

Pro Ala Gly Tyr Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu Thr
 1190 1195 1200

Asp Thr Val Trp Ile Glu Ile Gly Glu Thr Glu Gly Lys Phe Ile
 1205 1210 1215

Val Asp Ser Val Glu Leu Leu Leu Met Glu Glu
 1220 1225

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<211> 3690

<212> DNA

<213> artificial sequence

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<223> fully synthetic coding sequence

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<221> CDS

<222> (1)..(3690)

<223> fully synthetic nucleotide sequence encoding a Cry1Bb amino acid sequence variant

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 Met Ala Thr Ser Asn Arg Lys Asn Glu Asn Glu Ile Ile Asn Ala Leu
 1 5 10 15

tcg atc ccc acg gtc tgc aac ccg tcc acc caa atg aac ctg tcc ccg 96
 Ser Ile Pro Thr Val Ser Asn Pro Ser Thr Gln Met Asn Leu Ser Pro
 20 25 30

gac gcc cgc atc gag gac tcc ctg tgc gtc gcg gag gtc aac aac atc 144
 Asp Ala Arg Ile Glu Asp Ser Leu Cys Val Ala Glu Val Asn Asn Ile
 35 40 45

gac ccc ttc gtc tcc gcc tcc acg gtc cag acg ggc atc aac atc gct 192

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gcc atc gag gct gcc atc ttc cgc cca ccg cac ctc ctg gac ttc ccc Ala Ile Glu Ala Ala Ile Phe Arg Pro Pro His Leu Leu Asp Phe Pro	1008																
gag cag ctg acc atc tac tcc gcc tcg tcc cgc tgg tcg tcc acc cag Glu Gln Leu Thr Ile Tyr Ser Ala Ser Ser Arg Trp Ser Ser Thr Gln	1056																
cac atg aac tac tgg gtg ggc cac cgc ctc aac ttc agg ccc atc ggt His Met Asn Tyr Trp Val Gly His Arg Leu Asn Phe Arg Pro Ile Gly	1104																
ggc acc ctg aac acc tcc acc cag ggc ctg acc aac aac acc tcc atc Gly Thr Leu Asn Thr Ser Thr Gln Gly Leu Thr Asn Asn Thr Ser Ile	1152																
aac ccc gtc acc ctc cag ttc acg tcc cgc gac gtc tac cgc acc gag Asn Pro Val Thr Leu Gln Phe Thr Ser Arg Asp Val Tyr Arg Thr Glu	1200																
tcc aac gcc ggc acc aac atc ctc ttc acg acc cgc gtc aac ggc gtc Ser Asn Ala Gly Thr Asn Ile Leu Phe Thr Pro Val Asn Gly Val	1248																
ccc tgg gct cgc ttc aac ttc atc aac ccg cag aac atc tac gag cgt Pro Trp Ala Arg Phe Asn Phe Ile Asn Pro Gln Asn Ile Tyr Glu Arg	1296																
ggt gcg acc acc tac tcc cag ccg tac cag ggc gtc ggc atc cag ctc Gly Ala Thr Thr Tyr Ser Gln Pro Tyr Gln Gly Val Gly Ile Gln Leu	1344																
ttc gac tcc gag acc gag ctg cca ccc gag acg acc gag cgt ccc aac Phe Asp Ser Glu Thr Glu Leu Pro Pro Glu Thr Thr Glu Arg Pro Asn	1392																
tac gag tcc tac tcc cac cgc ctg tcc cac atc ggc ctg atc atc ggc Tyr Glu Ser Tyr Ser His Arg Leu Ser His Ile Gly Leu Ile Ile Gly	1440																
aac acc ctc agg gct ccc gtc tac tcc tgg acg cac cgc tcc gcg gag Asn Thr Leu Arg Ala Pro Val Tyr Ser Trp Thr His Arg Ser Ala Asp	1488																
cgc acg aac acg atc ggt ccc aac cgc atc acc cag atc ccc ctg gtc Arg Thr Asn Thr Ile Gly Pro Asn Arg Ile Thr Gln Ile Pro Leu Val	1536																
aag gcc ctc aac ctg cac tcc ggc gtc acc gtc gtg ggt ggc cca ggc Lys Ala Leu Asn Leu His Ser Gly Val Thr Val Val Gly Gly Pro Gly	1584																
ttc acc ggt ggc gac atc ctg cgc agg acc aac acg ggc acc ttc ggc Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr Asn Thr Gly Thr Phe Gly	1632																
gac atc cgc ctc aac atc aac gtc ccg ctg tcc cag cgc tac cgc gtc Asp Ile Arg Leu Asn Ile Asn Val Pro Leu Ser Gln Arg Tyr Arg Val	1680																
cgc atc cgc tac gcc tcc acg acc gag ctc cag ttc ttc acg cgc atc Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu Gln Phe Phe Thr Arg Ile	1728																
aac ggc acc acg gtc aac atc ggc aac ttc tcc cgc acc atg aac agg Asn Gly Thr Thr Val Asn Ile Gly Asn Phe Ser Arg Thr Met Asn Arg	1776																

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ccg ttc aac ttc ctc aac gcc cag tcc acc ttc acc ctt ggt gcg cag Pro Phe Asn Phe Leu Asn Ala Gln Ser Thr Phe Thr Leu Gly Ala Gln 610 615 620	1872
tcc ttc tcc aac cag gag gtc tac atc gac cgc gtc gag ttc gtc cca Ser Phe Ser Asn Gln Glu Val Tyr Ile Asp Arg Val Glu Phe Val Pro 625 630 635 640	1920
gcc gag gtc acc ttc gag gcc gag tac gac ctg gag cgt gcc cag aag Ala Glu Val Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys 645 650 655	1968
gcg gtg aac gcc ctg ttc acc tcc acc aac ccc agg cgc ctg aag acc Ala Val Asn Ala Leu Phe Thr Ser Thr Asn Pro Arg Arg Leu Lys Thr 660 665 670	2016
gac gtc acg gac tac cac atc gac cag gtg tcc aac atg gtg gcc tgc Asp Val Thr Asp Tyr His Ile Asp Gln Val Ser Asn Met Val Ala Cys 675 680 685	2064
ctc tcc gac gag ttc tgc ctg gac gag aag cgc gag ctg ttc gag aag Leu Ser Asp Glu Phe Cys Leu Asp Glu Lys Arg Glu Leu Phe Glu Lys 690 695 700	2112
gtc aag tac gcg aag cgc ctc tcc gac gag cgc aac ctg ctc cag gac Val Lys Tyr Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp 705 710 715 720	2160
ccg aac ttc acc ttc atc tcc ggc cag ctg tcc ttc gcg tcc atc gac Pro Asn Phe Thr Phe Ile Ser Gly Gln Leu Ser Phe Ala Ser Ile Asp 725 730 735	2208
ggc cag tcc aac ttc ccc tcc atc aac gag ctg tcc gag cac ggc tgg Gly Gln Ser Asn Phe Pro Ser Ile Asn Glu Leu Ser Glu His Gly Trp 740 745 750	2256
tgg ggc tcc gcg aac gtc acc atc cag gag ggc aac gac gtc ttc aag Trp Gly Ser Ala Asn Val Thr Ile Gln Glu Gly Asn Asp Val Phe Lys 755 760 765	2304
gag aac tac gtc acc ctg ccg ggc acc ttc aac gag tgc tac ccg aac Glu Asn Tyr Val Thr Leu Pro Gly Thr Phe Asn Glu Cys Tyr Pro Asn 770 775 780	2352
tac ctc tac cag aag atc ggc gag tcc gag ctg aag gcc tac acc cgc Tyr Leu Tyr Gln Lys Ile Gly Glu Ser Glu Leu Lys Ala Tyr Thr Arg 785 790 795 800	2400
tac cag ctg cgc ggc tac atc gag gac tcc cag gac ctg gag atc tac Tyr Gln Leu Arg Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr 805 810 815	2448
ctc atc cgc tac aac gcg aag cac gag acc ctg gac gtc cct ggc acg Leu Ile Arg Tyr Asn Ala Lys His Glu Thr Leu Asp Val Pro Gly Thr 820 825 830	2496
gac tcc ctg tgg ccc ctc tcc gtc gag tcg ccc atc ggc cgc tgc ggc Asp Ser Leu Trp Pro Leu Ser Val Glu Ser Pro Ile Gly Arg Cys Gly 835 840 845	2544
gag ccc aac cgc tgc gct ccc cac ttc gag tgg aac ccc gac ctg gac Glu Pro Asn Arg Cys Ala Pro His Phe Glu Trp Asn Pro Asp Leu Asp 850 855 860	2592

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850	855	860	
tgc tcc tgc cgc gac ggc gag cgc tgc gcg cac cat tcc cat cac ttc	Cys Ser Cys Arg Asp Gly Glu Arg Cys Ala His Ser His His Phe	865 870 875 880	2640
acc ctg gac atc gac gtc ggc tgc acc gac ctg cac gag aac ctg ggc	Thr Leu Asp Ile Asp Val Gly Cys Thr Asp Leu His Glu Asn Leu Gly	885 890 895	2688
gtg tgg gtg gtc ttc aag atc aag acg cag gag ggc tac gcc cgc ctg	Val Trp Val Val Phe Lys Ile Lys Thr Gln Glu Gly Tyr Ala Arg Leu	900 905 910	2736
ggc aac ctg gag ttc atc gag gag aag ccg ctg atc ggc gag gcg ctc	Gly Asn Leu Glu Phe Ile Glu Glu Lys Pro Leu Ile Gly Glu Ala Leu	915 920 925	2784
tcc cgc gtc aag cgt gcg gag aag aag tgg cgc gac aag cgc gag aag	Ser Arg Val Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Lys	930 935 940	2832
ctc cag ctg gag acc aag cgc gtc tac acc gag gcc aag gag gcc gtg	Leu Gln Leu Glu Thr Lys Arg Val Tyr Thr Glu Ala Lys Glu Ala Val	945 950 955 960	2880
gac gcc ctg ttc gtc gac tcc cag tac gac cag ctc cag gcg gac acc	Asp Ala Leu Phe Val Asp Ser Gln Tyr Asp Gln Leu Gln Ala Asp Thr	965 970 975	2928
aac atc ggc atg atc cat gcg gct gac aag ctg gtc cac cgc atc cgc	Asn Ile Gly Met Ile His Ala Ala Asp Lys Leu Val His Arg Ile Arg	980 985 990	2976
gag gcg tac ctg tcc gag ctg ccc gtc atc cct ggc gtc aac gcg gag	Glu Ala Tyr Leu Ser Glu Leu Pro Val Ile Pro Gly Val Asn Ala Glu	995 1000 1005	3024
atc ttc gag gag ctg gag ggc cac atc atc acc gcc atg tcc ctc	Ile Phe Glu Glu Leu Glu Gly His Ile Ile Thr Ala Met Ser Leu	1010 1015 1020	3069
tac gac gcg cgc aac gtg gtc aag aac ggc gac ttc aac aac ggc	Tyr Asp Ala Arg Asn Val Val Lys Asn Gly Asp Phe Asn Asn Gly	1025 1030 1035	3114
ctg acg tgc tgg aac gtc aag ggc cac gtc gac gtc cag caa tcc	Leu Thr Cys Trp Asn Val Lys Gly His Val Asp Val Gln Gln Ser	1040 1045 1050	3159
cac cac cgc tcc gac ctg gtc atc ccc gag tgg gag gcc gag gtg	His His Arg Ser Asp Leu Val Ile Pro Glu Trp Glu Ala Glu Val	1055 1060 1065	3204
tcc cag gcc gtc cgc gtc tgt ccg ggc agg ggc tac atc ctg cgc	Ser Gln Ala Val Arg Val Cys Pro Gly Arg Gly Tyr Ile Leu Arg	1070 1075 1080	3249
gtc acc gcg tac aag gag ggc tac ggc gag ggc tgc gtc acg atc	Val Thr Ala Tyr Lys Glu Gly Tyr Gly Glu Gly Cys Val Thr Ile	1085 1090 1095	3294
cac gag atc gag aac aac acc gac gag ctg aag ttc aag aac tgc	His Glu Ile Glu Asn Asn Thr Asp Glu Leu Lys Phe Lys Asn Cys	1100 1105 1110	3339
gag gag gag gag gtc tac ccg acg gac acc ggc acg tgc aac gac			3384

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Tyr	Thr	Ala	His	Gln	Gly	Thr	Ala	Ala	Cys	Asn	Ser	Arg	Asn	Ala	
1130						1135					1140				
ggc	tac	gag	gac	gcc	tac	gag	gtc	gac	acc	acc	gcc	tcc	gtc	aac	3474
Gly	Tyr	Glu	Asp	Ala	Tyr	Glu	Val	Asp	Thr	Thr	Ala	Ser	Val	Asn	
1145						1150					1155				
tac	aag	ccg	acc	tac	gag	gag	gag	acc	tac	acc	gac	gtc	cgt	cgc	3519
Tyr	Lys	Pro	Thr	Tyr	Glu	Glu	Glu	Thr	Tyr	Thr	Asp	Val	Arg	Arg	
1160						1165					1170				
gac	aac	cac	tgc	gag	tac	gac	cgc	ggc	tac	gtg	aac	tac	cca	ccc	3564
Asp	Asn	His	Cys	Glu	Tyr	Asp	Arg	Gly	Tyr	Val	Asn	Tyr	Pro	Pro	
1175						1180					1185				
gtc	ccc	gct	ggc	tac	gtc	acg	aag	gag	ctg	gag	tac	ttc	ccc	gag	3609
Val	Pro	Ala	Gly	Tyr	Val	Thr	Lys	Glu	Leu	Glu	Tyr	Phe	Pro	Glu	
1190						1195					1200				
acc	gac	acc	gtc	tgg	atc	gag	atc	ggc	gag	acg	gag	ggc	aag	ttc	3654
Thr	Asp	Thr	Val	Trp	Ile	Glu	Ile	Gly	Glu	Thr	Glu	Gly	Lys	Phe	
1205						1210					1215				
atc	gtc	gac	tcc	gtc	gag	ctg	ctc	ctg	atg	gag	gag				3690
Ile	Val	Asp	Ser	Val	Glu	Leu	Leu	Leu	Met	Glu	Glu				
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<213> artificial sequence

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<223> fully synthetic coding sequence

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35 40 45

Asp Pro Phe Val Ser Ala Ser Thr Val Gln Thr Gly Ile Asn Ile Ala
50 55 60

Gly Arg Ile Leu Gly Val Leu Gly Val Pro Phe Ala Gly Gln Leu Ala
65 70 75 80

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Ser Phe Tyr Ser Phe Leu Val Gly Glu Leu Trp Pro Ser Gly Arg Asp
 85 90 95
 Pro Trp Glu Ile Phe Leu Glu His Val Glu Gln Leu Ile Arg Gln Gln
 100 105 110
 Val Thr Glu Asn Thr Arg Asn Thr Ala Ile Ala Arg Leu Glu Gly Leu
 115 120 125
 Gly Arg Gly Tyr Arg Ser Tyr Gln Gln Ala Leu Glu Thr Trp Leu Asp
 130 135 140
 Asn Arg Asn Asp Ala Arg Ser Arg Ser Ile Ile Leu Glu Arg Tyr Val
 145 150 155 160
 Ala Leu Glu Leu Asp Ile Thr Thr Ala Ile Pro Leu Phe Arg Ile Arg
 165 170 175
 Asn Glu Glu Val Pro Leu Leu Met Val Tyr Ala Gln Ala Ala Asn Leu
 180 185 190
 His Leu Leu Leu Leu Arg Asp Ala Ser Leu Phe Gly Ser Glu Trp Gly
 195 200 205
 Met Ala Ser Ser Asp Val Asn Gln Tyr Tyr Gln Glu Gln Ile Arg Tyr
 210 215 220
 Thr Glu Glu Tyr Ser Asn His Cys Val Gln Trp Tyr Asn Thr Gly Leu
 225 230 235 240
 Asn Asn Leu Arg Gly Thr Asn Ala Glu Ser Trp Leu Arg Tyr Asn Gln
 245 250 255
 Phe Arg Arg Asp Leu Thr Leu Gly Val Leu Asp Leu Val Ala Leu Phe
 260 265 270
 Pro Ser Tyr Asp Thr Arg Thr Tyr Pro Ile Asn Thr Ser Ala Gln Leu
 275 280 285
 Thr Arg Glu Ile Tyr Thr Asp Pro Ile Gly Arg Thr Asn Ala Pro Ser
 290 295 300
 Gly Phe Ala Ser Thr Asn Trp Phe Asn Asn Asn Ala Pro Ser Phe Ser
 305 310 315 320
 Ala Ile Glu Ala Ala Ile Phe Arg Pro Pro His Leu Leu Asp Phe Pro
 325 330 335
 Glu Gln Leu Thr Ile Tyr Ser Ala Ser Ser Arg Trp Ser Ser Thr Gln
 340 345 350

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His Met Asn Tyr Trp Val Gly His Arg Leu Asn Phe Arg Pro Ile Gly
 355 360 365
 Gly Thr Leu Asn Thr Ser Thr Gln Gly Leu Thr Asn Asn Thr Ser Ile
 370 375 380
 Asn Pro Val Thr Leu Gln Phe Thr Ser Arg Asp Val Tyr Arg Thr Glu
 385 390 395 400
 Ser Asn Ala Gly Thr Asn Ile Leu Phe Thr Thr Pro Val Asn Gly Val
 405 410 415
 Pro Trp Ala Arg Phe Asn Phe Ile Asn Pro Gln Asn Ile Tyr Glu Arg
 420 425 430
 Gly Ala Thr Thr Tyr Ser Gln Pro Tyr Gln Gly Val Gly Ile Gln Leu
 435 440 445
 Phe Asp Ser Glu Thr Glu Leu Pro Pro Glu Thr Thr Glu Arg Pro Asn
 450 455 460
 Tyr Glu Ser Tyr Ser His Arg Leu Ser His Ile Gly Leu Ile Ile Gly
 465 470 475 480
 Asn Thr Leu Arg Ala Pro Val Tyr Ser Trp Thr His Arg Ser Ala Asp
 485 490 495
 Arg Thr Asn Thr Ile Gly Pro Asn Arg Ile Thr Gln Ile Pro Leu Val
 500 505 510
 Lys Ala Leu Asn Leu His Ser Gly Val Thr Val Val Gly Gly Pro Gly
 515 520 525
 Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr Asn Thr Gly Thr Phe Gly
 530 535 540
 Asp Ile Arg Leu Asn Ile Asn Val Pro Leu Ser Gln Arg Tyr Arg Val
 545 550 555 560
 Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu Gln Phe Phe Thr Arg Ile
 565 570 575
 Asn Gly Thr Thr Val Asn Ile Gly Asn Phe Ser Arg Thr Met Asn Arg
 580 585 590
 Gly Asp Asn Leu Glu Tyr Arg Ser Phe Arg Thr Ala Gly Phe Ser Thr
 595 600 605
 Pro Phe Asn Phe Leu Asn Ala Gln Ser Thr Phe Thr Leu Gly Ala Gln

Paper Copy Sequence Listing 15414A_v4.ST25.txt
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Ser Phe Ser Asn Gln Glu Val Tyr Ile Asp Arg Val Glu Phe Val Pro
 625 630 635 640

Ala Glu Val Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys
 645 650 655

Ala Val Asn Ala Leu Phe Thr Ser Thr Asn Pro Arg Arg Leu Lys Thr
 660 665 670

Asp Val Thr Asp Tyr His Ile Asp Gln Val Ser Asn Met Val Ala Cys
 675 680 685

Leu Ser Asp Glu Phe Cys Leu Asp Glu Lys Arg Glu Leu Phe Glu Lys
 690 695 700

Val Lys Tyr Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp
 705 710 715 720

Pro Asn Phe Thr Phe Ile Ser Gly Gln Leu Ser Phe Ala Ser Ile Asp
 725 730 735

Gly Gln Ser Asn Phe Pro Ser Ile Asn Glu Leu Ser Glu His Gly Trp
 740 745 750

Trp Gly Ser Ala Asn Val Thr Ile Gln Glu Gly Asn Asp Val Phe Lys
 755 760 765

Glu Asn Tyr Val Thr Leu Pro Gly Thr Phe Asn Glu Cys Tyr Pro Asn
 770 775 780

Tyr Leu Tyr Gln Lys Ile Gly Glu Ser Glu Leu Lys Ala Tyr Thr Arg
 785 790 795 800

Tyr Gln Leu Arg Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr
 805 810 815

Leu Ile Arg Tyr Asn Ala Lys His Glu Thr Leu Asp Val Pro Gly Thr
 820 825 830

Asp Ser Leu Trp Pro Leu Ser Val Glu Ser Pro Ile Gly Arg Cys Gly
 835 840 845

Glu Pro Asn Arg Cys Ala Pro His Phe Glu Trp Asn Pro Asp Leu Asp
 850 855 860

Cys Ser Cys Arg Asp Gly Glu Arg Cys Ala His His Ser His His Phe
 865 870 875 880

Paper Copy Sequence Listing 15414A_v4.ST25.txt

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 900 905 910
 Gly Asn Leu Glu Phe Ile Glu Glu Lys Pro Leu Ile Gly Glu Ala Leu
 915 920 925
 Ser Arg Val Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Lys
 930 935 940
 Leu Gln Leu Glu Thr Lys Arg Val Tyr Thr Glu Ala Lys Glu Ala Val
 945 950 955 960
 Asp Ala Leu Phe Val Asp Ser Gln Tyr Asp Gln Leu Gln Ala Asp Thr
 965 970 975
 Asn Ile Gly Met Ile His Ala Ala Asp Lys Leu Val His Arg Ile Arg
 980 985 990
 Glu Ala Tyr Leu Ser Glu Leu Pro Val Ile Pro Gly Val Asn Ala Glu
 995 1000 1005
 Ile Phe Glu Glu Leu Glu Gly His Ile Ile Thr Ala Met Ser Leu
 1010 1015 1020
 Tyr Asp Ala Arg Asn Val Val Lys Asn Gly Asp Phe Asn Asn Gly
 1025 1030 1035
 Leu Thr Cys Trp Asn Val Lys Gly His Val Asp Val Gln Gln Ser
 1040 1045 1050
 His His Arg Ser Asp Leu Val Ile Pro Glu Trp Glu Ala Glu Val
 1055 1060 1065
 Ser Gln Ala Val Arg Val Cys Pro Gly Arg Gly Tyr Ile Leu Arg
 1070 1075 1080
 Val Thr Ala Tyr Lys Glu Gly Tyr Gly Glu Gly Cys Val Thr Ile
 1085 1090 1095
 His Glu Ile Glu Asn Asn Thr Asp Glu Leu Lys Phe Lys Asn Cys
 1100 1105 1110
 Glu Glu Glu Glu Val Tyr Pro Thr Asp Thr Gly Thr Cys Asn Asp
 1115 1120 1125
 Tyr Thr Ala His Gln Gly Thr Ala Ala Cys Asn Ser Arg Asn Ala
 1130 1135 1140

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Gly Tyr Glu Asp Ala Tyr Glu Val Asp Thr Thr Ala Ser Val Asn
 1145 1150 1155
 Tyr Lys Pro Thr Tyr Glu Glu Glu Thr Tyr Thr Asp Val Arg Arg
 1160 1165 1170
 Asp Asn His Cys Glu Tyr Asp Arg Gly Tyr Val Asn Tyr Pro Pro
 1175 1180 1185
 Val Pro Ala Gly Tyr Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu
 1190 1195 1200
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 Ile Val Asp Ser Val Glu Leu Leu Leu Met Glu Glu
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<213> Artificial Sequence

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<221> CDS

<222> (526)..(1320)

<223> nptII

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<221> transcription termination & polyadenylation sequence

<222> (1315)..(1767)

<223> T-AGRtu.nos3'

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<222> (1325)..(1767)

<223> T-AGRtu.nos3'

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<222> (1809)..(2386)

<223> P-FMV

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<221> 5' untranslated leader

<222> (2407)..(2480)

<223> L-Os.betaTubulin

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<221> Intron

<222> (2498)..(2614)

<223> I-Os.PAL

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<222> (2644)..(6333)

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acccttcctc tatataagga	agttcatttc atttggagag gacacgctga	aatcaccagt	480
ctctctctac aagatcgggg	atctctagct agacgatcgt ttcgc	atg att gaa caa	537
		Met Ile Glu Gln	
		1	
gat gga ttg cac gca ggt tct ccg gcc gct tgg gtg gag agg cta ttc			585
Asp Gly Leu His Ala Gly Ser Pro Ala Ala Trp Val Glu Arg Leu Phe			
5 10 15 20			
ggc tat gac tgg gca caa cag aca atc ggc tgc tct gat gcc gcc gtg			633
Gly Tyr Asp Trp Ala Gln Gln Thr Ile Gly Cys Ser Asp Ala Ala Val			
25 30 35			
ttc cgg ctg tca gcg cag ggg cgc ccg gtt ctt ttt gtc aag acc gac			681
Phe Arg Leu Ser Ala Gln Gly Arg Pro Val Leu Phe Val Lys Thr Asp			
40 45 50			
ctg tcc ggt gcc ctg aat gaa ctg cag gac gag gca gcg cgg cta tcg			729
Leu Ser Gly Ala Leu Asn Glu Leu Gln Asp Glu Ala Ala Arg Leu Ser			
55 60 65			
tgg ctg gcc acg acg ggc gtt cct tgc gca gct gtg ctc gac gtt gtc			777
Trp Leu Ala Thr Thr Gly Val Pro Cys Ala Ala Val Leu Asp Val Val			
70 75 80			
act gaa gcg gga agg gac tgg ctg cta ttg ggc gaa gtg ccg ggg cag			825
Thr Glu Ala Gly Arg Asp Trp Leu Leu Leu Gly Glu Val Pro Gly Gln			
85 90 95 100			
gat ctc ctg tca tct cac ctt gct cct gcc gag aaa gta tcc atc atg			873
Asp Leu Leu Ser Ser His Leu Ala Pro Ala Glu Lys Val Ser Ile Met			
105 110 115			
gct gat gca atg cgg cgg ctg cat acg ctt gat ccg gct acc tgc cca			921
Ala Asp Ala Met Arg Arg Leu His Thr Leu Asp Pro Ala Thr Cys Pro			
120 125 130			
ttc gac cac caa gcg aaa cat cgc atc gag cga gca cgt act cgg atg			969
Phe Asp His Gln Ala Lys His Arg Ile Glu Arg Ala Arg Thr Arg Met			
135 140 145			
gaa gcc ggt ctt gtc gat cag gat gat ctg gac gaa gag cat cag ggg			1017
Glu Ala Gly Leu Val Asp Gln Asp Asp Leu Asp Glu Glu His Gln Gly			
150 155 160			
ctc gcg cca gcc gaa ctg ttc gcc agg ctc aag gcg cgc atg ccc gac			1065
Leu Ala Pro Ala Glu Leu Phe Ala Arg Leu Lys Ala Arg Met Pro Asp			
165 170 175 180			
ggc gag gat ctc gtc gtg acc cat ggc gat gcc tgc ttg ccg aat atc			1113
Gly Glu Asp Leu Val Val Thr His Gly Asp Ala Cys Leu Pro Asn Ile			
185 190 195			
atg gtg gaa aat ggc cgc ttt tct gga ttc atc gac tgt ggc cgg ctg			1161
Met Val Glu Asn Gly Arg Phe Ser Gly Phe Ile Asp Cys Gly Arg Leu			
200 205 210			

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ggt gtg gcg gac cgc tat cag gac ata gcg ttg gct acc cgt gat att Gly Val Ala Asp Arg Tyr Gln Asp Ile Ala Leu Ala Thr Arg Asp Ile 215 220 225	1209
gct gaa gag ctt ggc ggc gaa tgg gct gac cgc ttc ctc gtg ctt tac Ala Glu Glu Leu Gly Gly Glu Trp Ala Asp Arg Phe Leu Val Leu Tyr 230 235 240	1257
ggt atc gcc gct ccc gat tcg cag cgc atc gcc ttc tat cgc ctt ctt Gly Ile Ala Ala Pro Asp Ser Gln Arg Ile Ala Phe Tyr Arg Leu Leu 245 250 255 260	1305
gac gag ttc ttc tga gcgggactct ggggttcgaa atgaccgacc aagcgacgcc Asp Glu Phe Phe	1360
caacctgccca tcacgagatt tcgattccac cgccgccttc tatgaaagggt tgggcttcg	1420
aatcgttttc cgggacgccg gctggatgat cctccagcgc ggggatctca tgctggagtt	1480
cttcgcccac ccccgatcc ccatgggaat tcccgatcgt tcaaacattt ggcaataaag	1540
tttcttaaga ttgaatcctg ttgccggtct tgcatgatt atcatataat ttctgttgaa	1600
ttacgttaag catgtaataa ttaacatgta atgcatgacg ttatttatga gatgggtttt	1660
tatgattaga gtcccgcaat tatacattta atacgcgata gaaaacaaaa tatagcgcgc	1720
aaactaggat aaattatcgc gcgcggtgtc atctatgtta ctagatcggg gatatccccg	1780
cggccgcgtt aacaagcttg agctcaggat ttagcagcat tccagattgg gttcaatcaa	1840
caaggtacga gccatatcac ttatttcaaa ttggtatcgc caaaaccaag aaggaactcc	1900
catcctcaaa ggtttgtaag gaagaattct cagtccaaag cctcaacaag gtcagggtac	1960
agagtctcca aaccattagc caaaagctac aggagatcaa tgaagaatct tcaatcaaag	2020
taaactactg ttccagcaca tgcatcatgg tcagtaagtt tcagaaaaag acatccaccg	2080
aagacttaaa gttagtgggc atctttgaaa gtaatcttgt caacatcgag cagctggctt	2140
gtggggacca gacaaaaaag gaatggtgca gaattgttag gcgcacctac caaaagcatc	2200
tttgccttta ttgcaaagat aaagcagatt cctctagtac aagtggggaa caaaataacg	2260
tggaaaagag ctgtcctgac agcccactca ctaatgcgta tgacgaacgc agtgacgacc	2320
acaaaagaat tccctctata taagaaggca ttatttccca ttgaaaggat catcagatac	2380
tgaaccaatc cttctagaag atcgtgtcca cccaccctc gatctctcgc tcgccgccgc	2440
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aggattagga ttccaaataa gcgataacgt ttacctggtc actgcgatta gttcagttta	2560
ctgtgaaatt ctttggaacc ttcttaatta taaatttgct tgttttctcg gcagattcct	2620
caatgccggt ctagaggatc tcc atg gcc acc tcc aac cgc aag aac gag aat Met Ala Thr Ser Asn Arg Lys Asn Glu Asn 265 270	2673
gag atc atc aac gcc ctg tcg atc ccc acg gtc tcg aac ccg tcc acc Glu Ile Ile Asn Ala Leu Ser Ile Pro Thr Val Ser Asn Pro Ser Thr 275 280 285 290	2721

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caa atg aac ctg tcc ccg gac gcc cgc atc gag gac tcc ctg tgc gtc Gln Met Asn Leu Ser Pro Asp Ala Arg Ile Glu Asp Ser Leu Cys Val 295 300 305	2769
gcg gag gtc aac aac atc gac ccc ttc gtc tcc gcc tcc acg gtc cag Ala Glu Val Asn Asn Ile Asp Pro Phe Val Ser Ala Ser Thr Val Gln 310 315 320	2817
acg ggc atc aac atc gct ggc cgc atc ctc ggc gtc ctg ggc gtc ccg Thr Gly Ile Asn Ile Ala Gly Arg Ile Leu Gly Val Leu Gly Val Pro 325 330 335	2865
ttc gct ggc cag ctg gcc tcc ttc tac tcc ttc ctg gtc ggg gag ctg Phe Ala Gly Gln Leu Ala Ser Phe Tyr Ser Phe Leu Val Gly Glu Leu 340 345 350	2913
tgg ccc tcc ggt cgc gac ccc tgg gag atc ttc ctg gag cac gtc gag Trp Pro Ser Gly Arg Asp Pro Trp Glu Ile Phe Leu Glu His Val Glu 355 360 365 370	2961
cag ctc atc cgc cag caa gtc acc gag aac acc cgc aac acg gcc atc Gln Leu Ile Arg Gln Gln Val Thr Glu Asn Thr Arg Asn Thr Ala Ile 375 380 385	3009
gcc cgc ctg gag ggc ctg ggc cgt ggc tac cgc tcc tac cag cag gcc Ala Arg Leu Glu Gly Leu Gly Arg Gly Tyr Arg Ser Tyr Gln Gln Ala 390 395 400	3057
ctg gag acc tgg ctg gac aac cgc aac gac gca cgc tcc cgc tcc atc Leu Glu Thr Trp Leu Asp Asn Arg Asn Asp Ala Arg Ser Arg Ser Ile 405 410 415	3105
atc ctg gag cgc tac gtg gcg ctg gag ctg gac atc acc acc gcc atc Ile Leu Glu Arg Tyr Val Ala Leu Glu Leu Asp Ile Thr Thr Ala Ile 420 425 430	3153
ccg ctc ttc cgc atc cgc aat gaa gag gtg ccc ctg ctc atg gtc tac Pro Leu Phe Arg Ile Arg Asn Glu Glu Val Pro Leu Leu Met Val Tyr 435 440 445 450	3201
gcc cag gct gcc aac ctg cac ctg ctc ctg ctt cgc gat gca tcc ctg Ala Gln Ala Ala Asn Leu His Leu Leu Leu Leu Arg Asp Ala Ser Leu 455 460 465	3249
ttc ggc tcc gag tgg ggc atg gcc tcg tcc gac gtc aac cag tac tat Phe Gly Ser Glu Trp Gly Met Ala Ser Ser Asp Val Asn Gln Tyr Tyr 470 475 480	3297
cag gag cag atc cgc tac acc gag gag tac tcc aac cac tgc gtc cag Gln Glu Gln Ile Arg Tyr Thr Glu Glu Tyr Ser Asn His Cys Val Gln 485 490 495	3345
tgg tac aac acc ggc ctc aac aac ctg cgc ggc acg aac gct gag tcc Trp Tyr Asn Thr Gly Leu Asn Asn Leu Arg Gly Thr Asn Ala Glu Ser 500 505 510	3393
tgg ctg cgc tac aac cag ttc cgc cgc gac ctg acg ctg ggc gtc ctg Trp Leu Arg Tyr Asn Gln Phe Arg Arg Asp Leu Thr Leu Gly Val Leu 515 520 525 530	3441
gac ctg gtc gcc ctc ttc ccc tcc tac gac acc cgc acc tac ccc atc Asp Leu Val Ala Leu Phe Pro Ser Tyr Asp Thr Arg Thr Tyr Pro Ile 535 540 545	3489
aac acg tcc gcc cag ctg acc cgc gag atc tac acc gac ccc atc ggc Asn Thr Ser Ala Gln Leu Thr Arg Glu Ile Tyr Thr Asp Pro Ile Gly 550 555 560	3537

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cgc acc aac gct ccc tcc ggc ttc gcg tcc acg aac tgg ttc aac aac Arg Thr Asn Ala Pro Ser Gly Phe Ala Ser Thr Asn Trp Phe Asn Asn 565 570 575	3585
aat gcc ccg tcg ttc tcc ggc atc gag gct gcg atc ttc cgc cca ccg Asn Ala Pro Ser Phe Ser Ala Ile Glu Ala Ala Ile Phe Arg Pro Pro 580 585 590	3633
cac ctc ctg gac ttc ccc gag cag ctg acc atc tac tcc gcc tcg tcc His Leu Leu Asp Phe Pro Glu Gln Leu Thr Ile Tyr Ser Ala Ser Ser 595 600 605 610	3681
cgc tgg tcg tcc acc cag cac atg aac tac tgg gtg ggc cac cgc ctc Arg Trp Ser Ser Thr Gln His Met Asn Tyr Trp Val Gly His Arg Leu 615 620 625	3729
aac ttc agg ccc atc ggt ggc acc ctg aac acc tcc acc cag ggc ctg Asn Phe Arg Pro Ile Gly Gly Thr Leu Asn Thr Ser Thr Gln Gly Leu 630 635 640	3777
acc aac aac acc tcc atc aac ccc gtc acc ctc cag ttc acg tcc cgc Thr Asn Asn Thr Ser Ile Asn Pro Val Thr Leu Gln Phe Thr Ser Arg 645 650 655	3825
gac gtc tac cgc acc gag tcc aac gcc ggc acc aac atc ctc ttc acg Asp Val Tyr Arg Thr Glu Ser Asn Ala Gly Thr Asn Ile Leu Phe Thr 660 665 670	3873
acc ccg gtc aac ggc gtc ccc tgg gct cgc ttc aac ttc atc aac ccg Thr Pro Val Asn Gly Val Pro Trp Ala Arg Phe Asn Phe Ile Asn Pro 675 680 685 690	3921
cag aac atc tac gag cgt ggt gcg acc acc tac tcc cag ccg tac cag Gln Asn Ile Tyr Glu Arg Gly Ala Thr Thr Tyr Ser Gln Pro Tyr Gln 695 700 705	3969
ggc gtc ggc atc cag ctc ttc gac tcc gag acc gag ctg cca ccc gag Gly Val Gly Ile Gln Leu Phe Asp Ser Glu Thr Glu Leu Pro Pro Glu 710 715 720	4017
acg acc gag cgt ccc aac tac gag tcc tac tcc cac cgc ctg tcc cac Thr Thr Glu Arg Pro Asn Tyr Glu Ser Tyr Ser His Arg Leu Ser His 725 730 735	4065
atc ggc ctg atc atc ggc aac acc ctc agg gct ccc gtc tac tcc tgg Ile Gly Leu Ile Ile Gly Asn Thr Leu Arg Ala Pro Val Tyr Ser Trp 740 745 750	4113
acg cac cgc tcc gcg gac cgc acg aac acg atc ggt ccc aac cgc atc Thr His Arg Ser Ala Asp Arg Thr Asn Thr Ile Gly Pro Asn Arg Ile 755 760 765 770	4161
acc cag atc ccc ctg gtc aag gcc ctc aac ctg cac tcc ggc gtc acc Thr Gln Ile Pro Leu Val Lys Ala Leu Asn Leu His Ser Gly Val Thr 775 780 785	4209
gtc gtg ggt ggc cca ggc ttc acc ggt ggc gac atc ctg cgc agg acc Val Val Gly Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr 790 795 800	4257
aac acg ggc acc ttc ggc gac atc cgc ctc aac atc aac gtc ccg ctg Asn Thr Gly Thr Phe Gly Asp Ile Arg Leu Asn Ile Asn Val Pro Leu 805 810 815	4305
tcc cag cgc tac cgc gtc cgc atc cgc tac gcc tcc acg acc gac ctc Ser Gln Arg Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu	4353

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820	825	830	
cag ttc ttc acg cgc atc aac ggc acc acg gtc aac atc ggc aac ttc Gln Phe Phe Thr Arg Ile Asn Gly Thr Thr Val Asn Ile Gly Asn Phe 835 840 845 850			4401
tcc cgc acc atg aac agg ggc gac aac ctg gag tac cgc tcc ttc cgc Ser Arg Thr Met Asn Arg Gly Asp Asn Leu Glu Tyr Arg Ser Phe Arg 855 860 865			4449
acc gcc ggc ttc tcc acc ccg ttc aac ttc ctc aac gcc cag tcc acc Thr Ala Gly Phe Ser Thr Pro Phe Asn Phe Leu Asn Ala Gln Ser Thr 870 875 880			4497
ttc acc ctt ggt gcg cag tcc ttc tcc aac cag gag gtc tac atc gac Phe Thr Leu Gly Ala Gln Ser Phe Ser Asn Gln Glu Val Tyr Ile Asp 885 890 895			4545
cgc gtc gag ttc gtc cca gcc gag gtc acc ttc gag gcc gag tac gac Arg Val Glu Phe Val Pro Ala Glu Val Thr Phe Glu Ala Glu Tyr Asp 900 905 910			4593
ctg gag cgt gcc cag aag gcg gtg aac gcc ctg ttc acc tcc acc aac Leu Glu Arg Ala Gln Lys Ala Val Asn Ala Leu Phe Thr Ser Thr Asn 915 920 925 930			4641
ccc agg cgc ctg aag acc gac gtc acg gac tac cac atc gac cag gtg Pro Arg Arg Leu Lys Thr Asp Val Thr Asp Tyr His Ile Asp Gln Val 935 940 945			4689
tcc aac atg gtg gcc tgc ctc tcc gac gag ttc tgc ctg gac gag aag Ser Asn Met Val Ala Cys Leu Ser Asp Glu Phe Cys Leu Asp Glu Lys 950 955 960			4737
cgc gag ctg ttc gag aag gtc aag tac gcg aag cgc ctc tcc gac gag Arg Glu Leu Phe Glu Lys Val Lys Tyr Ala Lys Arg Leu Ser Asp Glu 965 970 975			4785
cgc aac ctg ctc cag gac ccg aac ttc acc ttc atc tcc ggc cag ctg Arg Asn Leu Leu Gln Asp Pro Asn Phe Thr Phe Ile Ser Gly Gln Leu 980 985 990			4833
tcc ttc gcg tcc atc gac ggc cag tcc aac ttc ccc tcc atc aac Ser Phe Ala Ser Ile Asp Gly Gln Ser Asn Phe Pro Ser Ile Asn 995 1000 1005			4878
gag ctg tcc gag cac ggc tgg tgg ggc tcc gcg aac gtc acc atc Glu Leu Ser Glu His Gly Trp Trp Gly Ser Ala Asn Val Thr Ile 1010 1015 1020			4923
cag gag ggc aac gac gtc ttc aag gag aac tac gtc acc ctg ccg Gln Glu Gly Asn Asp Val Phe Lys Glu Asn Tyr Val Thr Leu Pro 1025 1030 1035			4968
ggc acc ttc aac gag tgc tac ccg aac tac ctc tac cag aag atc Gly Thr Phe Asn Glu Cys Tyr Pro Asn Tyr Leu Tyr Gln Lys Ile 1040 1045 1050			5013
ggc gag tcc gag ctg aag gcc tac acc cgc tac cag ctg cgc ggc Gly Glu Ser Glu Leu Lys Ala Tyr Thr Arg Tyr Gln Leu Arg Gly 1055 1060 1065			5058
tac atc gag gac tcc cag gac ctg gag atc tac ctc atc cgc tac Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr 1070 1075 1080			5103
aac gcg aag cac gag acc ctg gac gtc cct ggc acg gac tcc ctg			5148

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Asn 1085	Ala	Lys	His	Glu	Thr 1090	Leu	Asp	Val	Pro	Gly 1095	Thr	Asp	Ser	Leu
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aac Asn 1115	cgc Arg	tgc Cys	gct Ala	ccc Pro	cac His 1120	ttc Phe	gag Glu	tgg Trp	aac Asn	ccc Pro 1125	gac Asp	ctg Leu	gac Asp	tgc Cys
tcc Ser 1130	tgc Cys	cgc Arg	gac Asp	ggc Gly	gag Glu 1135	cgc Arg	tgc Cys	gcg Ala	cac His	cat His 1140	tcc Ser	cat His	cac His	ttc Phe
acc Thr 1145	ctg Leu	gac Asp	atc Ile	gac Asp	gtc Val 1150	ggc Gly	tgc Cys	acc Thr	gac Asp	ctg Leu 1155	cac His	gag Glu	aac Asn	ctg Leu
ggc Gly 1160	gtg Val	tgg Trp	gtg Val	gtc Val	ttc Phe 1165	aag Lys	atc Ile	aag Lys	acg Thr	cag Gln 1170	gag Glu	ggc Gly	tac Tyr	gcc Ala
cgc Arg 1175	ctg Leu	ggc Gly	aac Asn	ctg Leu	gag Glu 1180	ttc Phe	atc Ile	gag Glu	gag Glu	aag Lys 1185	ccg Pro	ctg Leu	atc Ile	ggc Gly
gag Glu 1190	gcg Ala	ctc Leu	tcc Ser	cgc Arg	gtc Val 1195	aag Lys	cgt Arg	gcg Ala	gag Glu	aag Lys 1200	aag Lys	tgg Trp	cgc Arg	gac Asp
aag Lys 1205	cgc Arg	gag Glu	aag Lys	ctc Leu	cag Gln 1210	ctg Leu	gag Glu	acc Thr	aag Lys	cgc Arg 1215	gtc Val	tac Tyr	acc Thr	gag Glu
gcc Ala 1220	aag Lys	gag Glu	gcc Ala	gtg Val	gac Asp 1225	gcc Ala	ctg Leu	ttc Phe	gtc Val	gac Asp 1230	tcc Ser	cag Gln	tac Tyr	gac Asp
cag Gln 1235	ctc Leu	cag Gln	gcg Ala	gac Asp	acc Thr 1240	aac Asn	atc Ile	ggc Gly	atg Met	atc Ile 1245	cat His	gcg Ala	gct Ala	gac Asp
aag Lys 1250	ctg Leu	gtc Val	cac His	cgc Arg	atc Ile 1255	cgc Arg	gag Glu	gcg Ala	tac Tyr	ctg Leu 1260	tcc Ser	gag Glu	ctg Leu	ccc Pro
gtc Val 1265	atc Ile	cct Pro	ggc Gly	gtc Val	aac Asn 1270	gcg Ala	gag Glu	atc Ile	ttc Phe	gag Glu 1275	gag Glu	ctg Leu	gag Glu	ggc Gly
cac His 1280	atc Ile	atc Ile	acc Thr	gcc Ala	atg Met 1285	tcc Ser	ctc Leu	tac Tyr	gac Asp	gcg Ala 1290	cgc Arg	aac Asn	gtg Val	gtc Val
aag Lys 1295	aac Asn	ggc Gly	gac Asp	ttc Phe	aac Asn 1300	aac Asn	ggc Gly	ctg Leu	acg Thr	tgc Cys 1305	tgg Trp	aac Asn	gtc Val	aag Lys
ggc Gly 1310	cac His	gtc Val	gac Asp	gtc Val	cag Gln 1315	caa Gln	tcc Ser	cac His	cac His	cgc Arg 1320	tcc Ser	gac Asp	ctg Leu	gtc Val
atc Ile 1325	ccc Pro	gag Glu	tgg Trp	gag Glu	gcc Ala 1330	gag Glu	gtg Val	tcc Ser	cag Gln	gcc Ala 1335	gtc Val	cgc Arg	gtc Val	tgt Cys

Paper Copy Sequence Listing 15414A_v4.ST25.txt

ccg ggc agg ggc tac atc ctg cgc gtc acc gcg tac aag gag ggc Pro Gly Arg Gly Tyr Ile Leu Arg Val Thr Ala Tyr Lys Glu Gly 1340 1345 1350	5913
tac ggc gag ggc tgc gtc acg atc cac gag atc gag aac aac acc Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile Glu Asn Asn Thr 1355 1360 1365	5958
gac gag ctg aag ttc aag aac tgc gag gag gag gag gtc tac ccg Asp Glu Leu Lys Phe Lys Asn Cys Glu Glu Glu Glu Val Tyr Pro 1370 1375 1380	6003
acg gac acc ggc acg tgc aac gac tac acc gcg cac cag ggc acc Thr Asp Thr Gly Thr Cys Asn Asp Tyr Thr Ala His Gln Gly Thr 1385 1390 1395	6048
gct gcc tgc aac tcc cgc aac gct ggc tac gag gag gcc tac gag Ala Ala Cys Asn Ser Arg Asn Ala Gly Tyr Glu Asp Ala Tyr Glu 1400 1405 1410	6093
gtc gac acc acc gcc tcc gtc aac tac aag ccg acc tac gag gag Val Asp Thr Thr Ala Ser Val Asn Tyr Lys Pro Thr Tyr Glu Glu 1415 1420 1425	6138
gag acc tac acc gac gtc cgt cgc gac aac cac tgc gag tac gac Glu Thr Tyr Thr Asp Val Arg Arg Asp Asn His Cys Glu Tyr Asp 1430 1435 1440	6183
cgc ggc tac gtg aac tac cca ccc gtc ccc gct ggc tac gtc acg Arg Gly Tyr Val Asn Tyr Pro Pro Val Pro Ala Gly Tyr Val Thr 1445 1450 1455	6228
aag gag ctg gag tac ttc ccc gag acc gac acc gtc tgg atc gag Lys Glu Leu Glu Tyr Phe Pro Glu Thr Asp Thr Val Trp Ile Glu 1460 1465 1470	6273
atc ggc gag acg gag ggc aag ttc atc gtc gac tcc gtc gag ctg Ile Gly Glu Thr Glu Gly Lys Phe Ile Val Asp Ser Val Glu Leu 1475 1480 1485	6318
ctc ctg atg gag gag tgatagaatt ctaaattctta ttattatcat cgtcgtcgtc Leu Leu Met Glu Glu 1490	6373
gtctcgtcac ggaattaatt aaagtaccta ctccgtactt agctagctac aataataagg	6433
attcattgat cactacaaga gtgatcgact cgactgtagt atgtgtgtgc aatataatgt	6493
gctgtctatc aacaactact agtattgtca tttttttcga accagggaac tttttaatga	6553
taagaagaaa aagacaagta cttattgtcg agcatgcgtg tgtgttt	6600

<210> 6

<211> 264

<212> PRT

<213> Artificial Sequence

<220>

<223> fully synthetic expression cassette

Paper Copy Sequence Listing 15414A_v4.ST25.txt

<400> 6

Met Ile Glu Gln Asp Gly Leu His Ala Gly Ser Pro Ala Ala Trp Val
 1 5 10 15
 Glu Arg Leu Phe Gly Tyr Asp Trp Ala Gln Gln Thr Ile Gly Cys Ser
 20 25 30
 Asp Ala Ala Val Phe Arg Leu Ser Ala Gln Gly Arg Pro Val Leu Phe
 35 40 45
 Val Lys Thr Asp Leu Ser Gly Ala Leu Asn Glu Leu Gln Asp Glu Ala
 50 55 60
 Ala Arg Leu Ser Trp Leu Ala Thr Thr Gly Val Pro Cys Ala Ala Val
 65 70 75 80
 Leu Asp Val Val Thr Glu Ala Gly Arg Asp Trp Leu Leu Leu Gly Glu
 85 90 95
 Val Pro Gly Gln Asp Leu Leu Ser Ser His Leu Ala Pro Ala Glu Lys
 100 105 110
 Val Ser Ile Met Ala Asp Ala Met Arg Arg Leu His Thr Leu Asp Pro
 115 120 125
 Ala Thr Cys Pro Phe Asp His Gln Ala Lys His Arg Ile Glu Arg Ala
 130 135 140
 Arg Thr Arg Met Glu Ala Gly Leu Val Asp Gln Asp Asp Leu Asp Glu
 145 150 155 160
 Glu His Gln Gly Leu Ala Pro Ala Glu Leu Phe Ala Arg Leu Lys Ala
 165 170 175
 Arg Met Pro Asp Gly Glu Asp Leu Val Val Thr His Gly Asp Ala Cys
 180 185 190
 Leu Pro Asn Ile Met Val Glu Asn Gly Arg Phe Ser Gly Phe Ile Asp
 195 200 205
 Cys Gly Arg Leu Gly Val Ala Asp Arg Tyr Gln Asp Ile Ala Leu Ala
 210 215 220
 Thr Arg Asp Ile Ala Glu Glu Leu Gly Gly Glu Trp Ala Asp Arg Phe
 225 230 235 240
 Leu Val Leu Tyr Gly Ile Ala Ala Pro Asp Ser Gln Arg Ile Ala Phe
 245 250 255
 Tyr Arg Leu Leu Asp Glu Phe Phe

Paper Copy Sequence Listing 15414A_v4.ST25.txt

260

<210> 7

<211> 1230

<212> PRT

<213> Artificial Sequence

<220>

<223> fully synthetic expression cassette

<400> 7

Met Ala Thr Ser Asn Arg Lys Asn Glu Asn Glu Ile Ile Asn Ala Leu
 1 5 10 15

Ser Ile Pro Thr Val Ser Asn Pro Ser Thr Gln Met Asn Leu Ser Pro
 20 25 30

Asp Ala Arg Ile Glu Asp Ser Leu Cys Val Ala Glu Val Asn Asn Ile
 35 40 45

Asp Pro Phe Val Ser Ala Ser Thr Val Gln Thr Gly Ile Asn Ile Ala
 50 55 60

Gly Arg Ile Leu Gly Val Leu Gly Val Pro Phe Ala Gly Gln Leu Ala
 65 70 75 80

Ser Phe Tyr Ser Phe Leu Val Gly Glu Leu Trp Pro Ser Gly Arg Asp
 85 90 95

Pro Trp Glu Ile Phe Leu Glu His Val Glu Gln Leu Ile Arg Gln Gln
 100 105 110

Val Thr Glu Asn Thr Arg Asn Thr Ala Ile Ala Arg Leu Glu Gly Leu
 115 120 125

Gly Arg Gly Tyr Arg Ser Tyr Gln Gln Ala Leu Glu Thr Trp Leu Asp
 130 135 140

Asn Arg Asn Asp Ala Arg Ser Arg Ser Ile Ile Leu Glu Arg Tyr Val
 145 150 155 160

Ala Leu Glu Leu Asp Ile Thr Thr Ala Ile Pro Leu Phe Arg Ile Arg
 165 170 175

Asn Glu Glu Val Pro Leu Leu Met Val Tyr Ala Gln Ala Ala Asn Leu
 180 185 190

Paper Copy Sequence Listing 15414A_v4.ST25.txt

His Leu Leu Leu Arg Asp Ala Ser Leu Phe Gly Ser Glu Trp Gly
 195 200 205
 Met Ala Ser Ser Asp Val Asn Gln Tyr Tyr Gln Glu Gln Ile Arg Tyr
 210 215 220
 Thr Glu Glu Tyr Ser Asn His Cys Val Gln Trp Tyr Asn Thr Gly Leu
 225 230 235 240
 Asn Asn Leu Arg Gly Thr Asn Ala Glu Ser Trp Leu Arg Tyr Asn Gln
 245 250 255
 Phe Arg Arg Asp Leu Thr Leu Gly Val Leu Asp Leu Val Ala Leu Phe
 260 265 270
 Pro Ser Tyr Asp Thr Arg Thr Tyr Pro Ile Asn Thr Ser Ala Gln Leu
 275 280 285
 Thr Arg Glu Ile Tyr Thr Asp Pro Ile Gly Arg Thr Asn Ala Pro Ser
 290 295 300
 Gly Phe Ala Ser Thr Asn Trp Phe Asn Asn Asn Ala Pro Ser Phe Ser
 305 310 315 320
 Ala Ile Glu Ala Ala Ile Phe Arg Pro Pro His Leu Leu Asp Phe Pro
 325 330 335
 Glu Gln Leu Thr Ile Tyr Ser Ala Ser Ser Arg Trp Ser Ser Thr Gln
 340 345 350
 His Met Asn Tyr Trp Val Gly His Arg Leu Asn Phe Arg Pro Ile Gly
 355 360 365
 Gly Thr Leu Asn Thr Ser Thr Gln Gly Leu Thr Asn Asn Thr Ser Ile
 370 375 380
 Asn Pro Val Thr Leu Gln Phe Thr Ser Arg Asp Val Tyr Arg Thr Glu
 385 390 395 400
 Ser Asn Ala Gly Thr Asn Ile Leu Phe Thr Thr Pro Val Asn Gly Val
 405 410 415
 Pro Trp Ala Arg Phe Asn Phe Ile Asn Pro Gln Asn Ile Tyr Glu Arg
 420 425 430
 Gly Ala Thr Thr Tyr Ser Gln Pro Tyr Gln Gly Val Gly Ile Gln Leu
 435 440 445
 Phe Asp Ser Glu Thr Glu Leu Pro Pro Glu Thr Thr Glu Arg Pro Asn
 450 455 460

Paper Copy Sequence Listing 15414A_v4.ST25.txt

Tyr Glu Ser Tyr Ser His Arg Leu Ser His Ile Gly Leu Ile Ile Gly
 465 470 475 480
 Asn Thr Leu Arg Ala Pro Val Tyr Ser Trp Thr His Arg Ser Ala Asp
 485 490 495
 Arg Thr Asn Thr Ile Gly Pro Asn Arg Ile Thr Gln Ile Pro Leu Val
 500 505 510
 Lys Ala Leu Asn Leu His Ser Gly Val Thr Val Val Gly Gly Pro Gly
 515 520 525
 Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr Asn Thr Gly Thr Phe Gly
 530 535 540
 Asp Ile Arg Leu Asn Ile Asn Val Pro Leu Ser Gln Arg Tyr Arg Val
 545 550 555 560
 Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu Gln Phe Phe Thr Arg Ile
 565 570 575
 Asn Gly Thr Thr Val Asn Ile Gly Asn Phe Ser Arg Thr Met Asn Arg
 580 585 590
 Gly Asp Asn Leu Glu Tyr Arg Ser Phe Arg Thr Ala Gly Phe Ser Thr
 595 600 605
 Pro Phe Asn Phe Leu Asn Ala Gln Ser Thr Phe Thr Leu Gly Ala Gln
 610 615 620
 Ser Phe Ser Asn Gln Glu Val Tyr Ile Asp Arg Val Glu Phe Val Pro
 625 630 635 640
 Ala Glu Val Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys
 645 650 655
 Ala Val Asn Ala Leu Phe Thr Ser Thr Asn Pro Arg Arg Leu Lys Thr
 660 665 670
 Asp Val Thr Asp Tyr His Ile Asp Gln Val Ser Asn Met Val Ala Cys
 675 680 685
 Leu Ser Asp Glu Phe Cys Leu Asp Glu Lys Arg Glu Leu Phe Glu Lys
 690 695 700
 Val Lys Tyr Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp
 705 710 715 720
 Pro Asn Phe Thr Phe Ile Ser Gly Gln Leu Ser Phe Ala Ser Ile Asp
 725 730 735

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Gly Gln Ser Asn Phe Pro Ser Ile Asn Glu Leu Ser Glu His Gly Trp
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 Trp Gly Ser Ala Asn Val Thr Ile Gln Glu Gly Asn Asp Val Phe Lys
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 Glu Asn Tyr Val Thr Leu Pro Gly Thr Phe Asn Glu Cys Tyr Pro Asn
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 Tyr Gln Leu Arg Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr
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 Leu Ile Arg Tyr Asn Ala Lys His Glu Thr Leu Asp Val Pro Gly Thr
 820 825 830
 Asp Ser Leu Trp Pro Leu Ser Val Glu Ser Pro Ile Gly Arg Cys Gly
 835 840 845
 Glu Pro Asn Arg Cys Ala Pro His Phe Glu Trp Asn Pro Asp Leu Asp
 850 855 860
 Cys Ser Cys Arg Asp Gly Glu Arg Cys Ala His His Ser His His Phe
 865 870 875 880
 Thr Leu Asp Ile Asp Val Gly Cys Thr Asp Leu His Glu Asn Leu Gly
 885 890 895
 Val Trp Val Val Phe Lys Ile Lys Thr Gln Glu Gly Tyr Ala Arg Leu
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 Gly Asn Leu Glu Phe Ile Glu Glu Lys Pro Leu Ile Gly Glu Ala Leu
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 Ser Arg Val Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Lys
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 Leu Gln Leu Glu Thr Lys Arg Val Tyr Thr Glu Ala Lys Glu Ala Val
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 Asp Ala Leu Phe Val Asp Ser Gln Tyr Asp Gln Leu Gln Ala Asp Thr
 965 970 975
 Asn Ile Gly Met Ile His Ala Ala Asp Lys Leu Val His Arg Ile Arg
 980 985 990
 Glu Ala Tyr Leu Ser Glu Leu Pro Val Ile Pro Gly Val Asn Ala Glu
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995

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1005

Ile Phe Glu Glu Leu Glu Gly His Ile Ile Thr Ala Met Ser Leu
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His His Arg Ser Asp Leu Val Ile Pro Glu Trp Glu Ala Glu Val
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Ser Gln Ala Val Arg Val Cys Pro Gly Arg Gly Tyr Ile Leu Arg
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Val Thr Ala Tyr Lys Glu Gly Tyr Gly Glu Gly Cys Val Thr Ile
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Glu Glu Glu Glu Val Tyr Pro Thr Asp Thr Gly Thr Cys Asn Asp
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Val Pro Ala Gly Tyr Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu
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<223> I-Os.PAL

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Gly Tyr Asp Trp Ala Gln Gln Thr Ile Gly Cys Ser Asp Ala Ala Val	
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Phe Arg Leu Ser Ala Gln Gly Arg Pro Val Leu Phe Val Lys Thr Asp	
40 45 50	
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Leu Ser Gly Ala Leu Asn Glu Leu Gln Asp Glu Ala Arg Leu Ser	
55 60 65	
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Trp Leu Ala Thr Thr Gly Val Pro Cys Ala Ala Val Leu Asp Val Val	
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Thr Glu Ala Gly Arg Asp Trp Leu Leu Leu Gly Glu Val Pro Gly Gln	
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Phe Asp His Gln Ala Lys His Arg Ile Glu Arg Ala Arg Thr Arg Met	
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	Ala Glu Glu Leu Gly Gly Glu Trp Ala Asp Arg Phe Leu Val Leu Tyr				
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	Gly Ile Ala Ala Pro Asp Ser Gln Arg Ile Ala Phe Tyr Arg Leu Leu				
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	Asp Glu Phe Phe				
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ggc Gly 570	ttc Phe	gcg Ala	tcc Ser	acg Thr	aac Asn	tgg Trp 575	ttc Phe	aac Asn	aac Asn	aat Asn	gcc Ala 580	ccg Pro	tcg Ser	ttc Phe	tcc Ser	4000
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cgc Arg	acg Thr	aac Asn	acg Thr	atc Ile 765	ggc Gly	ccc Pro	aac Asn	cgc Arg	atc Ile 770	acc Thr	cag Gln	atc Ile	ccc Pro	ctg Leu 775	gtc Val	4576

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cgc atc cgc tac gcc tcc acg acc gac ctc cag ttc ttc acg cgc atc Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu Gln Phe Phe Thr Arg Ile 825 830 835 840	4768
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Ala Tyr Thr Arg Tyr	Gln Leu Arg Gly Tyr	Ile Glu Asp Ser Gln	
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Asp Leu Glu Ile Tyr	Leu Ile Arg Tyr Asn	Ala Lys His Glu Thr	
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Leu Glu Thr Lys Arg	Val Tyr Thr Glu Ala	Lys Glu Ala Val Asp	
1215	1220	1225	
gcc ctg ttc gtc gac	tcc cag tac gac cag	ctc cag gcg gac acc	5968
Ala Leu Phe Val Asp	Ser Gln Tyr Asp Gln	Leu Gln Ala Asp Thr	
1230	1235	1240	
aac atc ggc atg atc	cat gcg gct gac aag	ctg gtc cac cgc atc	6013
Asn Ile Gly Met Ile	His Ala Ala Asp Lys	Leu Val His Arg Ile	
1245	1250	1255	
cgc gag gcg tac ctg	tcc gag ctg ccc gtc	atc cct ggc gtc aac	6058
Arg Glu Ala Tyr Leu	Ser Glu Leu Pro Val	Ile Pro Gly Val Asn	
1260	1265	1270	
gcg gag atc ttc gag	gag ctg gag ggc cac	atc atc acc gcc atg	6103
Ala Glu Ile Phe Glu	Glu Leu Glu Gly His	Ile Ile Thr Ala Met	
1275	1280	1285	
tcc ctc tac gac gcg	cgc aac gtg gtc aag	aac ggc gac ttc aac	6148

Paper Copy Sequence Listing 15414A_v4.ST25.txt
 Ser Leu Tyr Asp Ala Arg Asn Val Val Lys Asn Gly Asp Phe Asn
 1290 1295 1300

aac ggc ctg acg tgc tgg aac gtc aag ggc cac gtc gac gtc cag 6193
 Asn Gly Leu Thr Cys Trp Asn Val Lys Gly His Val Asp Val Gln 1315
 1305 1310 1315

caa tcc cac cac cgc tcc gac ctg gtc atc ccc gag tgg gag gcc 6238
 Gln Ser His His Arg Ser Asp Leu Val Ile Pro Glu Trp Glu Ala 1330
 1320 1325 1330

gag gtg tcc cag gcc gtc cgc gtc tgt ccg ggc agg ggc tac atc 6283
 Glu Val Ser Gln Ala Val Arg Val Cys Pro Gly Arg Gly Tyr Ile 1345
 1335 1340 1345

ctg cgc gtc acc gcg tac aag gag ggc tac ggc gag ggc tgc gtc 6328
 Leu Arg Val Thr Ala Tyr Lys Glu Gly Tyr Gly Glu Gly Cys Val 1360
 1350 1355 1360

acg atc cac gag atc gag aac aac acc gac gag ctg aag ttc aag 6373
 Thr Ile His Glu Ile Glu Asn Asn Thr Asp Glu Leu Lys Phe Lys 1375
 1365 1370 1375

aac tgc gag gag gag gag gtc tac ccg acg gac acc ggc acg tgc 6418
 Asn Cys Glu Glu Glu Glu Val Tyr Pro Thr Asp Thr Gly Thr Cys 1390
 1380 1385 1390

aac gac tac acc gcg cac cag ggc acc gct gcc tgc aac tcc cgc 6463
 Asn Asp Tyr Thr Ala His Gln Gly Thr Ala Ala Cys Asn Ser Arg 1405
 1395 1400 1405

aac gct ggc tac gag gag gac gcc tac gag gtc gac acc acc gcc tcc 6508
 Asn Ala Gly Tyr Glu Asp Ala Tyr Glu Val Asp Thr Thr Ala Ser 1420
 1410 1415 1420

gtc aac tac aag ccg acc tac gag gag gag acc tac acc gac gtc 6553
 Val Asn Tyr Lys Pro Thr Tyr Glu Glu Glu Thr Tyr Thr Asp Val 1435
 1425 1430 1435

cgt cgc gac aac cac tgc gag tac gac cgc ggc tac gtg aac tac 6598
 Arg Arg Asp Asn His Cys Glu Tyr Asp Arg Gly Tyr Val Asn Tyr 1450
 1440 1445 1450

cca ccc gtc ccc gct ggc tac gtc acg aag gag ctg gag tac ttc 6643
 Pro Pro Val Pro Ala Gly Tyr Val Thr Lys Glu Leu Glu Tyr Phe 1465
 1455 1460 1465

ccc gag acc gac acc gtc tgg atc gag atc ggc gag acg gag ggc 6688
 Pro Glu Thr Asp Thr Val Trp Ile Glu Ile Gly Glu Thr Glu Gly 1480
 1470 1475 1480

aag ttc atc gtc gac tcc gtc gag ctg ctc ctg atg gag gag 6730
 Lys Phe Ile Val Asp Ser Val Glu Leu Leu Met Glu Glu 1490
 1485 1490

tgatagaatt ctaaatttta ttattatcat cgctcgtcgtc gtctcgtcac ggaattaatt 6790

aaagtaccta ctccgtactt agctagctac aataataagg attcattgat cactacaaga 6850

gtgatcgact cgactgtagt atgtgtgtgc aatataatgt gctgtctatc aacaactact 6910

agtattgtca tttttttcga accaggggaac tttttaatga taagaagaaa aagacaagta 6970

cttattgtcg agcatgcgtg tgtgtttttt 7000

Paper Copy Sequence Listing 15414A_v4.ST25.txt

<211> 264

<212> PRT

<213> Artificial Sequence

<220>

<223> fully synthetic expression cassette

<400> 9

Met Ile Glu Gln Asp Gly Leu His Ala Gly Ser Pro Ala Ala Trp Val
 1 5 10 15

Glu Arg Leu Phe Gly Tyr Asp Trp Ala Gln Gln Thr Ile Gly Cys Ser
 20 25 30

Asp Ala Ala Val Phe Arg Leu Ser Ala Gln Gly Arg Pro Val Leu Phe
 35 40 45

Val Lys Thr Asp Leu Ser Gly Ala Leu Asn Glu Leu Gln Asp Glu Ala
 50 55 60

Ala Arg Leu Ser Trp Leu Ala Thr Thr Gly Val Pro Cys Ala Ala Val
 65 70 75 80

Leu Asp Val Val Thr Glu Ala Gly Arg Asp Trp Leu Leu Leu Gly Glu
 85 90 95

Val Pro Gly Gln Asp Leu Leu Ser Ser His Leu Ala Pro Ala Glu Lys
 100 105 110

Val Ser Ile Met Ala Asp Ala Met Arg Arg Leu His Thr Leu Asp Pro
 115 120 125

Ala Thr Cys Pro Phe Asp His Gln Ala Lys His Arg Ile Glu Arg Ala
 130 135 140

Arg Thr Arg Met Glu Ala Gly Leu Val Asp Gln Asp Asp Leu Asp Glu
 145 150 155 160

Glu His Gln Gly Leu Ala Pro Ala Glu Leu Phe Ala Arg Leu Lys Ala
 165 170 175

Arg Met Pro Asp Gly Glu Asp Leu Val Val Thr His Gly Asp Ala Cys
 180 185 190

Leu Pro Asn Ile Met Val Glu Asn Gly Arg Phe Ser Gly Phe Ile Asp
 195 200 205

Paper Copy Sequence Listing 15414A_v4.ST25.txt

Cys Gly Arg Leu Gly Val Ala Asp Arg Tyr Gln Asp Ile Ala Leu Ala
 210 215 220

Thr Arg Asp Ile Ala Glu Glu Leu Gly Gly Glu Trp Ala Asp Arg Phe
 225 230 235 240

Leu Val Leu Tyr Gly Ile Ala Ala Pro Asp Ser Gln Arg Ile Ala Phe
 245 250 255

Tyr Arg Leu Leu Asp Glu Phe Phe
 260

<210> 10

<211> 1230

<212> PRT

<213> Artificial Sequence

<220>

<223> fully synthetic expression cassette

<400> 10

Met Ala Thr Ser Asn Arg Lys Asn Glu Asn Glu Ile Ile Asn Ala Leu
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Ser Ile Pro Thr Val Ser Asn Pro Ser Thr Gln Met Asn Leu Ser Pro
 20 25 30

Asp Ala Arg Ile Glu Asp Ser Leu Cys Val Ala Glu Val Asn Asn Ile
 35 40 45

Asp Pro Phe Val Ser Ala Ser Thr Val Gln Thr Gly Ile Asn Ile Ala
 50 55 60

Gly Arg Ile Leu Gly Val Leu Gly Val Pro Phe Ala Gly Gln Leu Ala
 65 70 75 80

Ser Phe Tyr Ser Phe Leu Val Gly Glu Leu Trp Pro Ser Gly Arg Asp
 85 90 95

Pro Trp Glu Ile Phe Leu Glu His Val Glu Gln Leu Ile Arg Gln Gln
 100 105 110

Val Thr Glu Asn Thr Arg Asn Thr Ala Ile Ala Arg Leu Glu Gly Leu
 115 120 125

Gly Arg Gly Tyr Arg Ser Tyr Gln Gln Ala Leu Glu Thr Trp Leu Asp
 130 135 140

Paper Copy Sequence Listing 15414A_v4.ST25.txt

Asn Arg Asn Asp Ala Arg Ser Arg Ser Ile Ile Leu Glu Arg Tyr Val
 145 150 155 160
 Ala Leu Glu Leu Asp Ile Thr Thr Ala Ile Pro Leu Phe Arg Ile Arg
 165 170 175
 Asn Glu Glu Val Pro Leu Leu Met Val Tyr Ala Gln Ala Ala Asn Leu
 180 185 190
 His Leu Leu Leu Leu Arg Asp Ala Ser Leu Phe Gly Ser Glu Trp Gly
 195 200 205
 Met Ala Ser Ser Asp Val Asn Gln Tyr Tyr Gln Glu Gln Ile Arg Tyr
 210 215 220
 Thr Glu Glu Tyr Ser Asn His Cys Val Gln Trp Tyr Asn Thr Gly Leu
 225 230 235 240
 Asn Asn Leu Arg Gly Thr Asn Ala Glu Ser Trp Leu Arg Tyr Asn Gln
 245 250 255
 Phe Arg Arg Asp Leu Thr Leu Gly Val Leu Asp Leu Val Ala Leu Phe
 260 265 270
 Pro Ser Tyr Asp Thr Arg Thr Tyr Pro Ile Asn Thr Ser Ala Gln Leu
 275 280 285
 Thr Arg Glu Ile Tyr Thr Asp Pro Ile Gly Arg Thr Asn Ala Pro Ser
 290 295 300
 Gly Phe Ala Ser Thr Asn Trp Phe Asn Asn Asn Ala Pro Ser Phe Ser
 305 310 315 320
 Ala Ile Glu Ala Ala Ile Phe Arg Pro Pro His Leu Leu Asp Phe Pro
 325 330 335
 Glu Gln Leu Thr Ile Tyr Ser Ala Ser Ser Arg Trp Ser Ser Thr Gln
 340 345 350
 His Met Asn Tyr Trp Val Gly His Arg Leu Asn Phe Arg Pro Ile Gly
 355 360 365
 Gly Thr Leu Asn Thr Ser Thr Gln Gly Leu Thr Asn Asn Thr Ser Ile
 370 375 380
 Asn Pro Val Thr Leu Gln Phe Thr Ser Arg Asp Val Tyr Arg Thr Glu
 385 390 395 400
 Ser Asn Ala Gly Thr Asn Ile Leu Phe Thr Thr Pro Val Asn Gly Val
 405 410 415

Paper Copy Sequence Listing 15414A_v4.ST25.txt

Pro Trp Ala Arg Phe Asn Phe Ile Asn Pro Gln Asn Ile Tyr Glu Arg
 420 425 430

Gly Ala Thr Thr Tyr Ser Gln Pro Tyr Gln Gly Val Gly Ile Gln Leu
 435 440 445

Phe Asp Ser Glu Thr Glu Leu Pro Pro Glu Thr Thr Glu Arg Pro Asn
 450 455 460

Tyr Glu Ser Tyr Ser His Arg Leu Ser His Ile Gly Leu Ile Ile Gly
 465 470 475 480

Asn Thr Leu Arg Ala Pro Val Tyr Ser Trp Thr His Arg Ser Ala Asp
 485 490 495

Arg Thr Asn Thr Ile Gly Pro Asn Arg Ile Thr Gln Ile Pro Leu Val
 500 505 510

Lys Ala Leu Asn Leu His Ser Gly Val Thr Val Val Gly Gly Pro Gly
 515 520 525

Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr Asn Thr Gly Thr Phe Gly
 530 535 540

Asp Ile Arg Leu Asn Ile Asn Val Pro Leu Ser Gln Arg Tyr Arg Val
 545 550 555 560

Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu Gln Phe Phe Thr Arg Ile
 565 570 575

Asn Gly Thr Thr Val Asn Ile Gly Asn Phe Ser Arg Thr Met Asn Arg
 580 585 590

Gly Asp Asn Leu Glu Tyr Arg Ser Phe Arg Thr Ala Gly Phe Ser Thr
 595 600 605

Pro Phe Asn Phe Leu Asn Ala Gln Ser Thr Phe Thr Leu Gly Ala Gln
 610 615 620

Ser Phe Ser Asn Gln Glu Val Tyr Ile Asp Arg Val Glu Phe Val Pro
 625 630 635 640

Ala Glu Val Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys
 645 650 655

Ala Val Asn Ala Leu Phe Thr Ser Thr Asn Pro Arg Arg Leu Lys Thr
 660 665 670

Asp Val Thr Asp Tyr His Ile Asp Gln Val Ser Asn Met Val Ala Cys

Paper Copy Sequence Listing 15414A_v4.ST25.txt

675

680

685

Leu Ser Asp Glu Phe Cys Leu Asp Glu Lys Arg Glu Leu Phe Glu Lys
 690 695 700

Val Lys Tyr Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp
 705 710 715 720

Pro Asn Phe Thr Phe Ile Ser Gly Gln Leu Ser Phe Ala Ser Ile Asp
 725 730 735

Gly Gln Ser Asn Phe Pro Ser Ile Asn Glu Leu Ser Glu His Gly Trp
 740 745 750

Trp Gly Ser Ala Asn Val Thr Ile Gln Glu Gly Asn Asp Val Phe Lys
 755 760 765

Glu Asn Tyr Val Thr Leu Pro Gly Thr Phe Asn Glu Cys Tyr Pro Asn
 770 775 780

Tyr Leu Tyr Gln Lys Ile Gly Glu Ser Glu Leu Lys Ala Tyr Thr Arg
 785 790 795 800

Tyr Gln Leu Arg Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr
 805 810 815

Leu Ile Arg Tyr Asn Ala Lys His Glu Thr Leu Asp Val Pro Gly Thr
 820 825 830

Asp Ser Leu Trp Pro Leu Ser Val Glu Ser Pro Ile Gly Arg Cys Gly
 835 840 845

Glu Pro Asn Arg Cys Ala Pro His Phe Glu Trp Asn Pro Asp Leu Asp
 850 855 860

Cys Ser Cys Arg Asp Gly Glu Arg Cys Ala His His Ser His His Phe
 865 870 875 880

Thr Leu Asp Ile Asp Val Gly Cys Thr Asp Leu His Glu Asn Leu Gly
 885 890 895

Val Trp Val Val Phe Lys Ile Lys Thr Gln Glu Gly Tyr Ala Arg Leu
 900 905 910

Gly Asn Leu Glu Phe Ile Glu Glu Lys Pro Leu Ile Gly Glu Ala Leu
 915 920 925

Ser Arg Val Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Lys
 930 935 940

Paper Copy Sequence Listing 15414A_v4.ST25.txt

Leu Gln Leu Glu Thr Lys Arg Val Tyr Thr Glu Ala Lys Glu Ala Val
 945 950 955 960
 Asp Ala Leu Phe Val Asp Ser Gln Tyr Asp Gln Leu Gln Ala Asp Thr
 965 970 975
 Asn Ile Gly Met Ile His Ala Ala Asp Lys Leu Val His Arg Ile Arg
 980 985 990
 Glu Ala Tyr Leu Ser Glu Leu Pro Val Ile Pro Gly Val Asn Ala Glu
 995 1000 1005
 Ile Phe Glu Glu Leu Glu Gly His Ile Ile Thr Ala Met Ser Leu
 1010 1015 1020
 Tyr Asp Ala Arg Asn Val Val Lys Asn Gly Asp Phe Asn Asn Gly
 1025 1030 1035
 Leu Thr Cys Trp Asn Val Lys Gly His Val Asp Val Gln Gln Ser
 1040 1045 1050
 His His Arg Ser Asp Leu Val Ile Pro Glu Trp Glu Ala Glu Val
 1055 1060 1065
 Ser Gln Ala Val Arg Val Cys Pro Gly Arg Gly Tyr Ile Leu Arg
 1070 1075 1080
 Val Thr Ala Tyr Lys Glu Gly Tyr Gly Glu Gly Cys Val Thr Ile
 1085 1090 1095
 His Glu Ile Glu Asn Asn Thr Asp Glu Leu Lys Phe Lys Asn Cys
 1100 1105 1110
 Glu Glu Glu Glu Val Tyr Pro Thr Asp Thr Gly Thr Cys Asn Asp
 1115 1120 1125
 Tyr Thr Ala His Gln Gly Thr Ala Ala Cys Asn Ser Arg Asn Ala
 1130 1135 1140
 Gly Tyr Glu Asp Ala Tyr Glu Val Asp Thr Thr Ala Ser Val Asn
 1145 1150 1155
 Tyr Lys Pro Thr Tyr Glu Glu Glu Thr Tyr Thr Asp Val Arg Arg
 1160 1165 1170
 Asp Asn His Cys Glu Tyr Asp Arg Gly Tyr Val Asn Tyr Pro Pro
 1175 1180 1185
 Val Pro Ala Gly Tyr Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu
 1190 1195 1200

Paper Copy Sequence Listing 15414A_v4.ST25.txt

Thr Asp Thr Val Trp Ile Glu Ile Gly Glu Thr Glu Gly Lys Phe
1205 1210 1215

Ile Val Asp Ser Val Glu Leu Leu Leu Met Glu Glu
1220 1225 1230

<210> 11

<211> 5170

<212> DNA

<213> Artificial Sequence

<220>

<223> fully synthetic expression cassette

<220>

<221> promoter

<222> (26)..(640)

<223> P-e35S

<220>

<221> 5'UTL

<222> (665)..(735)

<223> L-Ta.CAB

<220>

<221> Intron

<222> (749)..(1239)

<223> I-0s.ACT1

<220>

<221> CDS

<222> (1241)..(4930)

<223> Cry1Bb variant

<220>

<221> transcription_termination_sequence

Paper Copy Sequence Listing 15414A_v4.ST25.txt

<222> (4931)..(4936)

<223> miscellaneous

<220>

<221> polyadenylation sequence

<222> (4937)..(5170)

<223> T-Ta.hsp70

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aaaaggaagg tggctcctac aaatgccatc attgcgataa aggaaaggcc atcgttgaag 180
atgcctctgc cgacagtggg cccaaagatg gacccccacc cacgaggagc atcgtggaaa 240
aagaagacgt tccaaccacg tcttcaaagc aagtggattg atgtgatggg ccgatgtgag 300
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cactttattg tgaagatagt ggaaaaggaa ggtggctcct acaaatgcca tcattgcgat 420
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gcctcgtgag gagctttttt gtaggtagaa gtgatcaacc atg gcc acc tcc aac 1255
Met Ala Thr Ser Asn
1 5

cgc aag aac gag aat gag atc atc aac gcc ctg tcg atc ccc acg gtc 1303
Arg Lys Asn Glu Asn Glu Ile Ile Asn Ala Leu Ser Ile Pro Thr Val
10 15 20

tcg aac ccg tcc acc caa atg aac ctg tcc ccg gac gcc cgc atc gag 1351
Ser Asn Pro Ser Thr Gln Met Asn Leu Ser Pro Asp Ala Arg Ile Glu

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Paper Copy Sequence Listing 15414A_v4.ST25.txt

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gcc tcc acg gtc cag acg ggc atc aac atc gct ggc cgc atc ctc ggc Ala Ser Thr Val Gln Thr Gly Ile Asn Ile Ala Gly Arg Ile Leu Gly 55 60 65			1447
gtc ctg ggc gtc ccg ttc gct ggc cag ctg gcc tcc ttc tac tcc ttc Val Leu Gly Val Pro Phe Ala Gly Gln Leu Ala Ser Phe Tyr Ser Phe 70 75 80 85			1495
ctg gtc ggg gag ctg tgg ccc tcc ggt cgc gac ccc tgg gag atc ttc Leu Val Gly Glu Leu Trp Pro Ser Gly Arg Asp Pro Trp Glu Ile Phe 90 95 100			1543
ctg gag cac gtc gag cag ctc atc cgc cag caa gtc acc gag aac acc Leu Glu His Val Glu Gln Leu Ile Arg Gln Gln Val Thr Glu Asn Thr 105 110 115			1591
cgc aac acg gcc atc gcc cgc ctg gag ggc ctg ggc cgt ggc tac cgc Arg Asn Thr Ala Ile Ala Arg Leu Glu Gly Leu Gly Arg Gly Tyr Arg 120 125 130			1639
tcc tac cag cag gcc ctg gag acc tgg ctg gac aac cgc aac gac gca Ser Tyr Gln Gln Ala Leu Glu Thr Trp Leu Asp Asn Arg Asn Asp Ala 135 140 145			1687
cgc tcc cgc tcc atc atc ctg gag cgc tac gtg gcg ctg gag ctg gac Arg Ser Arg Ser Ile Ile Leu Glu Arg Tyr Val Ala Leu Glu Leu Asp 150 155 160 165			1735
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ctg ctc atg gtc tac gcc cag gct gcc aac ctg cac ctg ctc ctg ctt Leu Leu Met Val Tyr Ala Gln Ala Ala Asn Leu His Leu Leu Leu 185 190 195			1831
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acg aac gct gag tcc tgg ctg cgc tac aac cag ttc cgc cgc gac ctg Thr Asn Ala Glu Ser Trp Leu Arg Tyr Asn Gln Phe Arg Arg Asp Leu 250 255 260			2023
acg ctg ggc gtc ctg gac ctg gtc gcc ctc ttc ccc tcc tac gac acc Thr Leu Gly Val Leu Asp Leu Val Ala Leu Phe Pro Ser Tyr Asp Thr 265 270 275			2071
cgc acc tac ccc atc aac acg tcc gcc cag ctg acc cgc gag atc tac Arg Thr Tyr Pro Ile Asn Thr Ser Ala Gln Leu Thr Arg Glu Ile Tyr 280 285 290			2119
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Paper Copy Sequence Listing 15414A_v4.ST25.txt

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atc Ile	ttc Phe	cgc Arg	cca Pro	ccg Pro 330	cac His	ctc Leu	ctg Leu	gac Asp	ttc Phe 335	ccc Pro	gag Glu	cag Gln	ctg Leu	acc Thr 340	atc Ile	2263
tac Tyr	tcc Ser	gcc Ala	tcg Ser 345	tcc Ser	cgc Arg	tgg Trp	tcg Ser	tcc Ser 350	acc Thr	cag Gln	cac His	atg Met	aac Asn 355	tac Tyr	tgg Trp	2311
gtg Val	ggc Gly	cac His 360	cgc Arg	ctc Leu	aac Asn	ttc Phe	agg Arg 365	ccc Pro	atc Ile	ggt Gly	ggc Gly	acc Thr 370	ctg Leu	aac Asn	acc Thr	2359
tcc Ser 375	acc Thr	cag Gln	ggc Gly	ctg Leu	acc Thr	aac Asn 380	aac Asn	acc Thr	tcc Ser	atc Ile	aac Asn 385	ccc Pro	gtc Val	acc Thr	ctc Leu	2407
cag Gln 390	ttc Phe	acg Thr	tcc Ser	cgc Arg	gac Asp 395	gtc Val	tac Tyr	cgc Arg	acc Thr	gag Glu 400	tcc Ser	aac Asn	gcc Ala	ggc Gly	acc Thr 405	2455
aac Asn	atc Ile	ctc Leu	ttc Phe	acg Thr 410	acc Thr	ccg Pro	gtc Val	aac Asn	ggc Gly 415	gtc Val	ccc Pro	tgg Trp	gct Ala	cgc Arg 420	ttc Phe	2503
aac Asn	ttc Phe	atc Ile	aac Asn 425	ccg Pro	cag Gln	aac Asn	atc Ile	tac Tyr 430	gag Glu	cgt Arg	ggt Gly	gcg Ala	acc Thr 435	acc Thr	tac Tyr	2551
tcc Ser	cag Gln	ccg Pro 440	tac Tyr	cag Gln	ggc Gly	gtc Val	ggc Gly 445	atc Ile	cag Gln	ctc Leu	ttc Phe	gac Asp 450	tcc Ser	gag Glu	acc Thr	2599
gag Glu 455	ctg Leu	cca Pro	ccc Pro	gag Glu	acg Thr	acc Thr 460	gag Glu	cgt Arg	ccc Pro	aac Asn	tac Tyr 465	gag Glu	tcc Ser	tac Tyr	tcc Ser	2647
cac His 470	cgc Arg	ctg Leu	tcc Ser	cac His	atc Ile 475	ggc Gly	ctg Leu	atc Ile	atc Ile	ggc Gly 480	aac Asn	acc Thr	ctc Leu	agg Arg	gct Ala 485	2695
ccc Pro	gtc Val	tac Tyr	tcc Ser	tgg Trp 490	acg Thr	cac His	cgc Arg	tcc Ser	gcg Ala 495	gac Asp	cgc Arg	acg Thr	aac Asn	acg Thr 500	atc Ile	2743
ggt Gly	ccc Pro	aac Asn	cgc Arg 505	atc Ile	acc Thr	cag Gln	atc Ile	ccc Pro 510	ctg Leu	gtc Val	aag Lys	gcc Ala	ctc Leu 515	aac Asn	ctg Leu	2791
cac His	tcc Ser	ggc Gly 520	gtc Val	acc Thr	gtc Val	gtg Val	ggt Gly 525	ggc Gly	cca Pro	ggc Gly	ttc Phe	acc Thr 530	ggt Gly	ggc Gly	gac Asp	2839
atc Ile	ctg Leu 535	cgc Arg	agg Arg	acc Thr	aac Asn	acg Thr 540	ggc Gly	acc Thr	ttc Phe	ggc Gly	gac Asp 545	atc Ile	cgc Arg	ctc Leu	aac Asn	2887
atc Ile 550	aac Asn	gtc Val	ccg Pro	ctg Leu	tcc Ser 555	cag Gln	cgc Arg	tac Tyr	cgc Arg	gtc Val 560	cgc Arg	atc Ile	cgc Arg	tac Tyr	gcc Ala 565	2935

Paper Copy Sequence Listing 15414A_v4.ST25.txt																	
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aac	atc	ggc	aac	ttc	tcc	cgc	acc	atg	aac	agg	ggc	gac	aac	ctg	gag		3031
Asn	Ile	Gly	Asn	Phe	Ser	Arg	Thr	Met	Asn	Arg	Gly	Asp	Asn	Leu	Glu		
			585					590					595				
tac	cgc	tcc	ttc	cgc	acc	gcc	ggc	ttc	tcc	acc	ccg	ttc	aac	ttc	ctc		3079
Tyr	Arg	Ser	Phe	Arg	Thr	Ala	Gly	Phe	Ser	Thr	Pro	Phe	Asn	Phe	Leu		
		600					605					610					
aac	gcc	cag	tcc	acc	ttc	acc	ctt	ggt	gcg	cag	tcc	ttc	tcc	aac	cag		3127
Asn	Ala	Gln	Ser	Thr	Phe	Thr	Leu	Gly	Ala	Gln	Ser	Phe	Ser	Asn	Gln		
	615					620					625						
gag	gtc	tac	atc	gac	cgc	gtc	gag	ttc	gtc	cca	gcc	gag	gtc	acc	ttc		3175
Glu	Val	Tyr	Ile	Asp	Arg	Val	Glu	Phe	Val	Pro	Ala	Glu	Val	Thr	Phe		
	630				635					640					645		
gag	gcc	gag	tac	gac	ctg	gag	cgt	gcc	cag	aag	gcg	gtg	aac	gcc	ctg		3223
Glu	Ala	Glu	Tyr	Asp	Leu	Glu	Arg	Ala	Gln	Lys	Ala	Val	Asn	Ala	Leu		
				650					655					660			
ttc	acc	tcc	acc	aac	ccc	agg	cgc	ctg	aag	acc	gac	gtc	acg	gac	tac		3271
Phe	Thr	Ser	Thr	Asn	Pro	Arg	Arg	Leu	Lys	Thr	Asp	Val	Thr	Asp	Tyr		
			665					670					675				
cac	atc	gac	cag	gtg	tcc	aac	atg	gtg	gcc	tgc	ctc	tcc	gac	gag	ttc		3319
His	Ile	Asp	Gln	Val	Ser	Asn	Met	Val	Ala	Cys	Leu	Ser	Asp	Glu	Phe		
		680					685					690					
tgc	ctg	gac	gag	aag	cgc	gag	ctg	ttc	gag	aag	gtc	aag	tac	gcg	aag		3367
Cys	Leu	Asp	Glu	Lys	Arg	Glu	Leu	Phe	Glu	Lys	Val	Lys	Tyr	Ala	Lys		
	695					700					705						
cgc	ctc	tcc	gac	gag	cgc	aac	ctg	ctc	cag	gac	ccg	aac	ttc	acc	ttc		3415
Arg	Leu	Ser	Asp	Glu	Arg	Asn	Leu	Leu	Gln	Asp	Pro	Asn	Phe	Thr	Phe		
	710				715					720					725		
atc	tcc	ggc	cag	ctg	tcc	ttc	gcg	tcc	atc	gac	ggc	cag	tcc	aac	ttc		3463
Ile	Ser	Gly	Gln	Leu	Ser	Phe	Ala	Ser	Ile	Asp	Gly	Gln	Ser	Asn	Phe		
			730						735					740			
ccc	tcc	atc	aac	gag	ctg	tcc	gag	cac	ggc	tgg	tgg	ggc	tcc	gcg	aac		3511
Pro	Ser	Ile	Asn	Glu	Leu	Ser	Glu	His	Gly	Trp	Trp	Gly	Ser	Ala	Asn		
			745					750					755				
gtc	acc	atc	cag	gag	ggc	aac	gac	gtc	ttc	aag	gag	aac	tac	gtc	acc		3559
Val	Thr	Ile	Gln	Glu	Gly	Asn	Asp	Val	Phe	Lys	Glu	Asn	Tyr	Val	Thr		
		760					765					770					
ctg	ccg	ggc	acc	ttc	aac	gag	tgc	tac	ccg	aac	tac	ctc	tac	cag	aag		3607
Leu	Pro	Gly	Thr	Phe	Asn	Glu	Cys	Tyr	Pro	Asn	Tyr	Leu	Tyr	Gln	Lys		
			775			780					785						
atc	ggc	gag	tcc	gag	ctg	aag	gcc	tac	acc	cgc	tac	cag	ctg	cgc	ggc		3655
Ile	Gly	Glu	Ser	Glu	Leu	Lys	Ala	Tyr	Thr	Arg	Tyr	Gln	Leu	Arg	Gly		
	790				795					800				805			
tac	atc	gag	gac	tcc	cag	gac	ctg	gag	atc	tac	ctc	atc	cgc	tac	aac		3703
Tyr	Ile	Glu	Asp	Ser	Gln	Asp	Leu	Glu	Ile	Tyr	Leu	Ile	Arg	Tyr	Asn		
				810					815					820			
gcg	aag	cac	gag	acc	ctg	gac	gtc	cct	ggc	acg	gac	tcc	ctg	tgg	ccc		3751
Ala	Lys	His	Glu	Thr	Leu	Asp	Val	Pro	Gly	Thr	Asp	Ser	Leu	Trp	Pro		
			825					830					835				

Paper Copy Sequence Listing 15414A_v4.ST25.txt

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gct ccc cac ttc gag tgg aac ccc gac ctg gac tgc tcc tgc cgc gac Ala Pro His Phe Glu Trp Asn Pro Asp Leu Asp Cys Ser Cys Arg Asp 855 860 865	3847
ggc gag cgc tgc gcg cac cat tcc cat cac ttc acc ctg gac atc gac Gly Glu Arg Cys Ala His His Ser His His Phe Thr Leu Asp Ile Asp 870 875 880 885	3895
gtc ggc tgc acc gac ctg cac gag aac ctg ggc gtg tgg gtg gtc ttc Val Gly Cys Thr Asp Leu His Glu Asn Leu Gly Val Trp Val Val Phe 890 895 900	3943
aag atc aag acg cag gag ggc tac gcc cgc ctg ggc aac ctg gag ttc Lys Ile Lys Thr Gln Glu Gly Tyr Ala Arg Leu Gly Asn Leu Glu Phe 905 910 915	3991
atc gag gag aag ccg ctg atc ggc gag gcg ctc tcc cgc gtc aag cgt Ile Glu Glu Lys Pro Leu Ile Gly Glu Ala Leu Ser Arg Val Lys Arg 920 925 930	4039
gcg gag aag aag tgg cgc gac aag cgc gag aag ctc cag ctg gag acc Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Lys Leu Gln Leu Glu Thr 935 940 945	4087
aag cgc gtc tac acc gag gcc aag gag gcc gtg gac gcc ctg ttc gtc Lys Arg Val Tyr Thr Glu Ala Lys Glu Ala Val Asp Ala Leu Phe Val 950 955 960 965	4135
gac tcc cag tac gac cag ctc cag gcg gac acc aac atc ggc atg atc Asp Ser Gln Tyr Asp Gln Leu Gln Ala Asp Thr Asn Ile Gly Met Ile 970 975 980	4183
cat gcg gct gac aag ctg gtc cac cgc atc cgc gag gcg tac ctg tcc His Ala Ala Asp Lys Leu Val His Arg Ile Arg Glu Ala Tyr Leu Ser 985 990 995	4231
gag ctg ccc gtc atc cct ggc gtc aac gcg gag atc ttc gag gag Glu Leu Pro Val Ile Pro Gly Val Asn Ala Glu Ile Phe Glu Glu 1000 1005 1010	4276
ctg gag ggc cac atc atc acc gcc atg tcc ctc tac gac gcg cgc Leu Glu Gly His Ile Ile Thr Ala Met Ser Leu Tyr Asp Ala Arg 1015 1020 1025	4321
aac gtg gtc aag aac ggc gac ttc aac aac ggc ctg acg tgc tgg Asn Val Val Lys Asn Gly Asp Phe Asn Asn Gly Leu Thr Cys Trp 1030 1035 1040	4366
aac gtc aag ggc cac gtc gac gtc cag caa tcc cac cac cgc tcc Asn Val Lys Gly His Val Asp Val Gln Gln Ser His His Arg Ser 1045 1050 1055	4411
gac ctg gtc atc ccc gag tgg gag gcc gag gtg tcc cag gcc gtc Asp Leu Val Ile Pro Glu Trp Glu Ala Glu Val Ser Gln Ala Val 1060 1065 1070	4456
cgc gtc tgt ccg ggc agg ggc tac atc ctg cgc gtc acc gcg tac Arg Val Cys Pro Gly Arg Gly Tyr Ile Leu Arg Val Thr Ala Tyr 1075 1080 1085	4501
aag gag ggc tac ggc gag ggc tgc gtc acg atc cac gag atc gag Lys Glu Gly Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile Glu 1090 1095 1100	4546

Paper Copy Sequence Listing 15414A_v4.ST25.txt

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gtc tac ccg acg gac acc ggc acg tgc aac gac tac acc gcg cac	Val Tyr Pro Thr Asp Thr Gly Thr Cys Asn Asp Tyr Thr Ala His	1120 1125 1130	4636
cag ggc acc gct gcc tgc aac tcc cgc aac gct ggc tac gag gac	Gln Gly Thr Ala Ala Cys Asn Ser Arg Asn Ala Gly Tyr Glu Asp	1135 1140 1145	4681
gcc tac gag gtc gac acc acc gcc tcc gtc aac tac aag ccg acc	Ala Tyr Glu Val Asp Thr Thr Ala Ser Val Asn Tyr Lys Pro Thr	1150 1155 1160	4726
tac gag gag gag acc tac acc gac gtc cgt cgc gac aac cac tgc	Tyr Glu Glu Glu Thr Tyr Thr Asp Val Arg Arg Asp Asn His Cys	1165 1170 1175	4771
gag tac gac cgc ggc tac gtg aac tac cca ccc gtc ccc gct ggc	Glu Tyr Asp Arg Gly Tyr Val Asn Tyr Pro Pro Val Pro Ala Gly	1180 1185 1190	4816
tac gtc acg aag gag ctg gag tac ttc ccc gag acc gac acc gtc	Tyr Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu Thr Asp Thr Val	1195 1200 1205	4861
tgg atc gag atc ggc gag acg gag ggc aag ttc atc gtc gac tcc	Trp Ile Glu Ile Gly Glu Thr Glu Gly Lys Phe Ile Val Asp Ser	1210 1215 1220	4906
gtc gag ctg ctc ctg atg gag gag tgatagaatt ctgcatgcgt	Val Glu Leu Leu Leu Met Glu Glu	1225 1230	4950
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agtctgatga gacatctctg tattgtgttt ctttccccag tgttttctgt acttgtgtaa			5070
tcggctaatac gccaacagat tcggcgatga ataaatgaga aataaattgt tctgattttg			5130
agtgcacaaaa aaaaggaatt agatctgtgt gtgtttttttg			5170

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<211> 1230

<212> PRT

<213> Artificial Sequence

<220>

<223> fully synthetic expression cassette

<400> 12

Met	Ala	Thr	Ser	Asn	Arg	Lys	Asn	Glu	Asn	Glu	Ile	Ile	Asn	Ala	Leu
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Paper Copy Sequence Listing 15414A_v4.ST25.txt

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 Asp Ala Arg Ile Glu Asp Ser Leu Cys Val Ala Glu Val Asn Asn Ile
 35 40 45
 Asp Pro Phe Val Ser Ala Ser Thr Val Gln Thr Gly Ile Asn Ile Ala
 50 55 60
 Gly Arg Ile Leu Gly Val Leu Gly Val Pro Phe Ala Gly Gln Leu Ala
 65 70 75 80
 Ser Phe Tyr Ser Phe Leu Val Gly Glu Leu Trp Pro Ser Gly Arg Asp
 85 90 95
 Pro Trp Glu Ile Phe Leu Glu His Val Glu Gln Leu Ile Arg Gln Gln
 100 105 110
 Val Thr Glu Asn Thr Arg Asn Thr Ala Ile Ala Arg Leu Glu Gly Leu
 115 120 125
 Gly Arg Gly Tyr Arg Ser Tyr Gln Gln Ala Leu Glu Thr Trp Leu Asp
 130 135 140
 Asn Arg Asn Asp Ala Arg Ser Arg Ser Ile Ile Leu Glu Arg Tyr Val
 145 150 155 160
 Ala Leu Glu Leu Asp Ile Thr Thr Ala Ile Pro Leu Phe Arg Ile Arg
 165 170 175
 Asn Glu Glu Val Pro Leu Leu Met Val Tyr Ala Gln Ala Ala Asn Leu
 180 185 190
 His Leu Leu Leu Leu Arg Asp Ala Ser Leu Phe Gly Ser Glu Trp Gly
 195 200 205
 Met Ala Ser Ser Asp Val Asn Gln Tyr Tyr Gln Glu Gln Ile Arg Tyr
 210 215 220
 Thr Glu Glu Tyr Ser Asn His Cys Val Gln Trp Tyr Asn Thr Gly Leu
 225 230 235 240
 Asn Asn Leu Arg Gly Thr Asn Ala Glu Ser Trp Leu Arg Tyr Asn Gln
 245 250 255
 Phe Arg Arg Asp Leu Thr Leu Gly Val Leu Asp Leu Val Ala Leu Phe
 260 265 270
 Pro Ser Tyr Asp Thr Arg Thr Tyr Pro Ile Asn Thr Ser Ala Gln Leu
 275 280 285

Paper Copy Sequence Listing 15414A_v4.ST25.txt

Thr Arg Glu Ile Tyr Thr Asp Pro Ile Gly Arg Thr Asn Ala Pro Ser
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 Gly Phe Ala Ser Thr Asn Trp Phe Asn Asn Asn Ala Pro Ser Phe Ser
 305 310 315 320
 Ala Ile Glu Ala Ala Ile Phe Arg Pro Pro His Leu Leu Asp Phe Pro
 325 330 335
 Glu Gln Leu Thr Ile Tyr Ser Ala Ser Ser Arg Trp Ser Ser Thr Gln
 340 345 350
 His Met Asn Tyr Trp Val Gly His Arg Leu Asn Phe Arg Pro Ile Gly
 355 360 365
 Gly Thr Leu Asn Thr Ser Thr Gln Gly Leu Thr Asn Asn Thr Ser Ile
 370 375 380
 Asn Pro Val Thr Leu Gln Phe Thr Ser Arg Asp Val Tyr Arg Thr Glu
 385 390 395 400
 Ser Asn Ala Gly Thr Asn Ile Leu Phe Thr Thr Pro Val Asn Gly Val
 405 410 415
 Pro Trp Ala Arg Phe Asn Phe Ile Asn Pro Gln Asn Ile Tyr Glu Arg
 420 425 430
 Gly Ala Thr Thr Tyr Ser Gln Pro Tyr Gln Gly Val Gly Ile Gln Leu
 435 440 445
 Phe Asp Ser Glu Thr Glu Leu Pro Pro Glu Thr Thr Glu Arg Pro Asn
 450 455 460
 Tyr Glu Ser Tyr Ser His Arg Leu Ser His Ile Gly Leu Ile Ile Gly
 465 470 475 480
 Asn Thr Leu Arg Ala Pro Val Tyr Ser Trp Thr His Arg Ser Ala Asp
 485 490 495
 Arg Thr Asn Thr Ile Gly Pro Asn Arg Ile Thr Gln Ile Pro Leu Val
 500 505 510
 Lys Ala Leu Asn Leu His Ser Gly Val Thr Val Val Gly Gly Pro Gly
 515 520 525
 Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr Asn Thr Gly Thr Phe Gly
 530 535 540
 Asp Ile Arg Leu Asn Ile Asn Val Pro Leu Ser Gln Arg Tyr Arg Val
 545 550 555 560

Paper Copy Sequence Listing 15414A_v4.ST25.txt

Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu Gln Phe Phe Thr Arg Ile
 565 570 575
 Asn Gly Thr Thr Val Asn Ile Gly Asn Phe Ser Arg Thr Met Asn Arg
 580 585 590
 Gly Asp Asn Leu Glu Tyr Arg Ser Phe Arg Thr Ala Gly Phe Ser Thr
 595 600 605
 Pro Phe Asn Phe Leu Asn Ala Gln Ser Thr Phe Thr Leu Gly Ala Gln
 610 615 620
 Ser Phe Ser Asn Gln Glu Val Tyr Ile Asp Arg Val Glu Phe Val Pro
 625 630 635 640
 Ala Glu Val Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys
 645 650 655
 Ala Val Asn Ala Leu Phe Thr Ser Thr Asn Pro Arg Arg Leu Lys Thr
 660 665 670
 Asp Val Thr Asp Tyr His Ile Asp Gln Val Ser Asn Met Val Ala Cys
 675 680 685
 Leu Ser Asp Glu Phe Cys Leu Asp Glu Lys Arg Glu Leu Phe Glu Lys
 690 695 700
 Val Lys Tyr Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp
 705 710 715 720
 Pro Asn Phe Thr Phe Ile Ser Gly Gln Leu Ser Phe Ala Ser Ile Asp
 725 730 735
 Gly Gln Ser Asn Phe Pro Ser Ile Asn Glu Leu Ser Glu His Gly Trp
 740 745 750
 Trp Gly Ser Ala Asn Val Thr Ile Gln Glu Gly Asn Asp Val Phe Lys
 755 760 765
 Glu Asn Tyr Val Thr Leu Pro Gly Thr Phe Asn Glu Cys Tyr Pro Asn
 770 775 780
 Tyr Leu Tyr Gln Lys Ile Gly Glu Ser Glu Leu Lys Ala Tyr Thr Arg
 785 790 795 800
 Tyr Gln Leu Arg Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr
 805 810 815
 Leu Ile Arg Tyr Asn Ala Lys His Glu Thr Leu Asp Val Pro Gly Thr

Paper Copy Sequence Listing 15414A_v4.ST25.txt
 820 825 830

Asp Ser Leu Trp Pro Leu Ser Val Glu Ser Pro Ile Gly Arg Cys Gly
 835 840 845

Glu Pro Asn Arg Cys Ala Pro His Phe Glu Trp Asn Pro Asp Leu Asp
 850 855 860

Cys Ser Cys Arg Asp Gly Glu Arg Cys Ala His His Ser His His Phe
 865 870 875 880

Thr Leu Asp Ile Asp Val Gly Cys Thr Asp Leu His Glu Asn Leu Gly
 885 890 895

Val Trp Val Val Phe Lys Ile Lys Thr Gln Glu Gly Tyr Ala Arg Leu
 900 905 910

Gly Asn Leu Glu Phe Ile Glu Glu Lys Pro Leu Ile Gly Glu Ala Leu
 915 920 925

Ser Arg Val Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Lys
 930 935 940

Leu Gln Leu Glu Thr Lys Arg Val Tyr Thr Glu Ala Lys Glu Ala Val
 945 950 955 960

Asp Ala Leu Phe Val Asp Ser Gln Tyr Asp Gln Leu Gln Ala Asp Thr
 965 970 975

Asn Ile Gly Met Ile His Ala Ala Asp Lys Leu Val His Arg Ile Arg
 980 985 990

Glu Ala Tyr Leu Ser Glu Leu Pro Val Ile Pro Gly Val Asn Ala Glu
 995 1000 1005

Ile Phe Glu Glu Leu Glu Gly His Ile Ile Thr Ala Met Ser Leu
 1010 1015 1020

Tyr Asp Ala Arg Asn Val Val Lys Asn Gly Asp Phe Asn Asn Gly
 1025 1030 1035

Leu Thr Cys Trp Asn Val Lys Gly His Val Asp Val Gln Gln Ser
 1040 1045 1050

His His Arg Ser Asp Leu Val Ile Pro Glu Trp Glu Ala Glu Val
 1055 1060 1065

Ser Gln Ala Val Arg Val Cys Pro Gly Arg Gly Tyr Ile Leu Arg
 1070 1075 1080

Paper Copy Sequence Listing 15414A_v4.ST25.txt

Val Thr Ala Tyr Lys Glu Gly Tyr Gly Glu Gly Cys Val Thr Ile
 1085 1090 1095

His Glu Ile Glu Asn Asn Thr Asp Glu Leu Lys Phe Lys Asn Cys
 1100 1105 1110

Glu Glu Glu Glu Val Tyr Pro Thr Asp Thr Gly Thr Cys Asn Asp
 1115 1120 1125

Tyr Thr Ala His Gln Gly Thr Ala Ala Cys Asn Ser Arg Asn Ala
 1130 1135 1140

Gly Tyr Glu Asp Ala Tyr Glu Val Asp Thr Thr Ala Ser Val Asn
 1145 1150 1155

Tyr Lys Pro Thr Tyr Glu Glu Glu Thr Tyr Thr Asp Val Arg Arg
 1160 1165 1170

Asp Asn His Cys Glu Tyr Asp Arg Gly Tyr Val Asn Tyr Pro Pro
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Val Pro Ala Gly Tyr Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu
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Ile Val Asp Ser Val Glu Leu Leu Leu Met Glu Glu
 1220 1225 1230

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<213> Artificial Sequence

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<221> promoter

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<223> P-e35S

<220>

<221> 5'UTL

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<222> (665)..(735)

<223> L-Ta.CAB

<220>

<221> Intron

<222> (749)..(1239)

<223> I-Os.ACT1

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<221> Transit_peptide

<222> (1255)..(1401)

<223> TP-Zm.rbcS

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<221> Intron

<222> (1402)..(1564)

<223> I-Zm.rbcS

<220>

<221> transit_peptide

<222> (1565)..(1651)

<223> TP-Zm.rbcS

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<221> CDS

<222> (1652)..(5341)

<223> Cry1Bb variant

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<221> transcription termination sequence

<222> (5342)..(5347)

<223> miscellaneous

Paper Copy Sequence Listing 15414A_v4.ST25.txt

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<222> (5350)..(5592)

<223> T-Os.LDH

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Met Ala Thr Ser Asn Arg Lys

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Paper Copy Sequence Listing 15414A_v4.ST25.txt

1

5

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ccg tcc acc caa atg aac ctg tcc ccg gac gcc cgc atc gag gac tcc	1768
Pro Ser Thr Gln Met Asn Leu Ser Pro Asp Ala Arg Ile Glu Asp Ser	
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ctg tgc gtc gcg gag gtc aac aac atc gac ccc ttc gtc tcc gcc tcc	1816
Leu Cys Val Ala Glu Val Asn Asn Ile Asp Pro Phe Val Ser Ala Ser	
40 45 50 55	
acg gtc cag acg ggc atc aac atc gct ggc cgc atc ctc ggc gtc ctg	1864
Thr Val Gln Thr Gly Ile Asn Ile Ala Gly Arg Ile Leu Gly Val Leu	
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Gly Val Pro Phe Ala Gly Gln Leu Ala Ser Phe Tyr Ser Phe Leu Val	
75 80 85	
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Gly Glu Leu Trp Pro Ser Gly Arg Asp Pro Trp Glu Ile Phe Leu Glu	
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His Val Glu Gln Leu Ile Arg Gln Gln Val Thr Glu Asn Thr Arg Asn	
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acg gcc atc gcc cgc ctg gag ggc ctg ggc cgt ggc tac cgc tcc tac	2056
Thr Ala Ile Ala Arg Leu Glu Gly Leu Gly Arg Gly Tyr Arg Ser Tyr	
120 125 130 135	
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Gln Gln Ala Leu Glu Thr Trp Leu Asp Asn Arg Asn Asp Ala Arg Ser	
140 145 150	
cgc tcc atc atc ctg gag cgc tac gtg gcg ctg gag ctg gac atc acc	2152
Arg Ser Ile Ile Leu Glu Arg Tyr Val Ala Leu Glu Leu Asp Ile Thr	
155 160 165	
acc gcc atc ccg ctc ttc cgc atc cgc aat gaa gag gtg ccc ctg ctc	2200
Thr Ala Ile Pro Leu Phe Arg Ile Arg Asn Glu Glu Val Pro Leu Leu	
170 175 180	
atg gtc tac gcc cag gct gcc aac ctg cac ctg ctc ctg ctt cgc gat	2248
Met Val Tyr Ala Gln Ala Ala Asn Leu His Leu Leu Leu Arg Asp	
185 190 195	
gca tcc ctg ttc ggc tcc gag tgg ggc atg gcc tcg tcc gac gtc aac	2296
Ala Ser Leu Phe Gly Ser Glu Trp Gly Met Ala Ser Ser Asp Val Asn	
200 205 210 215	
cag tac tat cag gag cag atc cgc tac acc gag gag tac tcc aac cac	2344
Gln Tyr Tyr Gln Glu Gln Ile Arg Tyr Thr Glu Glu Tyr Ser Asn His	
220 225 230	
tgc gtc cag tgg tac aac acc ggc ctc aac aac ctg cgc ggc acg aac	2392
Cys Val Gln Trp Tyr Asn Thr Gly Leu Asn Asn Leu Arg Gly Thr Asn	
235 240 245	
gct gag tcc tgg ctg cgc tac aac cag ttc cgc cgc gac ctg acg ctg	2440
Ala Glu Ser Trp Leu Arg Tyr Asn Gln Phe Arg Arg Asp Leu Thr Leu	
250 255 260	
ggc gtc ctg gac ctg gtc gcc ctc ttc ccc tcc tac gac acc cgc acc	2488

Paper Copy Sequence Listing 15414A_v4.ST25.txt

Gly	Val	Leu	Asp	Leu	Val	Ala	Leu	Phe	Pro	Ser	Tyr	Asp	Thr	Arg	Thr	
265						270					275					
tac	ccc	atc	aac	acg	tcc	gcc	cag	ctg	acc	cgc	gag	atc	tac	acc	gac	2536
Tyr	Pro	Ile	Asn	Thr	Ser	Ala	Gln	Leu	Thr	Arg	Glu	Ile	Tyr	Thr	Asp	
280					285					290					295	
ccc	atc	ggc	cgc	acc	aac	gct	ccc	tcc	ggc	ttc	gcg	tcc	acg	aac	tgg	2584
Pro	Ile	Gly	Arg	Thr	Asn	Ala	Pro	Ser	Gly	Phe	Ala	Ser	Thr	Asn	Trp	
				300					305					310		
ttc	aac	aac	aat	gcc	ccg	tcg	ttc	tcc	gcc	atc	gag	gct	gcg	atc	ttc	2632
Phe	Asn	Asn	Asn	Ala	Pro	Ser	Phe	Ser	Ala	Ile	Glu	Ala	Ala	Ile	Phe	
				315					320				325			
cgc	cca	ccg	cac	ctc	ctg	gac	ttc	ccc	gag	cag	ctg	acc	atc	tac	tcc	2680
Arg	Pro	Pro	His	Leu	Leu	Asp	Phe	Pro	Glu	Gln	Leu	Thr	Ile	Tyr	Ser	
				330				335					340			
gcc	tcg	tcc	cgc	tgg	tcg	tcc	acc	cag	cac	atg	aac	tac	tgg	gtg	ggc	2728
Ala	Ser	Ser	Arg	Trp	Ser	Ser	Thr	Gln	His	Met	Asn	Tyr	Trp	Val	Gly	
	345					350					355					
cac	cgc	ctc	aac	ttc	agg	ccc	atc	ggc	ggc	acc	ctg	aac	acc	tcc	acc	2776
His	Arg	Leu	Asn	Phe	Arg	Pro	Ile	Gly	Gly	Thr	Leu	Asn	Thr	Ser	Thr	
					365					370					375	
cag	ggc	ctg	acc	aac	aac	acc	tcc	atc	aac	ccc	gtc	acc	ctc	cag	ttc	2824
Gln	Gly	Leu	Thr	Asn	Asn	Thr	Ser	Ile	Asn	Pro	Val	Thr	Leu	Gln	Phe	
				380					385					390		
acg	tcc	cgc	gac	gtc	tac	cgc	acc	gag	tcc	aac	gcc	ggc	acc	aac	atc	2872
Thr	Ser	Arg	Asp	Val	Tyr	Arg	Thr	Glu	Ser	Asn	Ala	Gly	Thr	Asn	Ile	
				395				400					405			
ctc	ttc	acg	acc	ccg	gtc	aac	ggc	gtc	ccc	tgg	gct	cgc	ttc	aac	ttc	2920
Leu	Phe	Thr	Thr	Pro	Val	Asn	Gly	Val	Pro	Trp	Ala	Arg	Phe	Asn	Phe	
		410					415					420				
atc	aac	ccg	cag	aac	atc	tac	gag	cgt	ggc	gcg	acc	acc	tac	tcc	cag	2968
Ile	Asn	Pro	Gln	Asn	Ile	Tyr	Glu	Arg	Gly	Ala	Thr	Thr	Tyr	Ser	Gln	
	425					430					435					
ccg	tac	cag	ggc	gtc	ggc	atc	cag	ctc	ttc	gac	tcc	gag	acc	gag	ctg	3016
Pro	Tyr	Gln	Gly	Val	Gly	Ile	Gln	Leu	Phe	Asp	Ser	Glu	Thr	Glu	Leu	
				445						450				455		
cca	ccc	gag	acg	acc	gag	cgt	ccc	aac	tac	gag	tcc	tac	tcc	cac	cgc	3064
Pro	Pro	Glu	Thr	Thr	Glu	Arg	Pro	Asn	Tyr	Glu	Ser	Tyr	Ser	His	Arg	
				460					465					470		
ctg	tcc	cac	atc	ggc	ctg	atc	atc	ggc	aac	acc	ctc	agg	gct	ccc	gtc	3112
Leu	Ser	His	Ile	Gly	Leu	Ile	Ile	Gly	Asn	Thr	Leu	Arg	Ala	Pro	Val	
				475				480					485			
tac	tcc	tgg	acg	cac	cgc	tcc	gcg	gac	cgc	acg	aac	acg	atc	ggc	ccc	3160
Tyr	Ser	Trp	Thr	His	Arg	Ser	Ala	Asp	Arg	Thr	Asn	Thr	Ile	Gly	Pro	
		490					495					500				
aac	cgc	atc	acc	cag	atc	ccc	ctg	gtc	aag	gcc	ctc	aac	ctg	cac	tcc	3208
Asn	Arg	Ile	Thr	Gln	Ile	Pro	Leu	Val	Lys	Ala	Leu	Asn	Leu	His	Ser	
	505					510					515					
ggc	gtc	acc	gtc	gtg	ggc	ggc	cca	ggc	ttc	acc	ggc	ggc	gac	atc	ctg	3256
Gly	Val	Thr	Val	Val	Gly	Gly	Pro	Gly	Phe	Thr	Gly	Gly	Asp	Ile	Leu	
					525					530					535	

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cgc agg acc aac acg ggc acc ttc ggc gac atc cgc ctc aac atc aac Arg Arg Thr Asn Thr Gly Thr Phe Gly Asp Ile Arg Leu Asn Ile Asn 540 545 550	3304
gtc ccg ctg tcc cag cgc tac cgc gtc cgc atc cgc tac gcc tcc acg Val Pro Leu Ser Gln Arg Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr 555 560 565	3352
acc gac ctc cag ttc ttc acg cgc atc aac ggc acc acg gtc aac atc Thr Asp Leu Gln Phe Phe Thr Arg Ile Asn Gly Thr Thr Val Asn Ile 570 575 580	3400
ggc aac ttc tcc cgc acc atg aac agg ggc gac aac ctg gag tac cgc Gly Asn Phe Ser Arg Thr Met Asn Arg Gly Asp Asn Leu Glu Tyr Arg 585 590 595	3448
tcc ttc cgc acc gcc ggc ttc tcc acc ccg ttc aac ttc ctc aac gcc Ser Phe Arg Thr Ala Gly Phe Ser Thr Pro Phe Asn Phe Leu Asn Ala 600 605 610 615	3496
cag tcc acc ttc acc ctt ggt gcg cag tcc ttc tcc aac cag gag gtc Gln Ser Thr Phe Thr Leu Gly Ala Gln Ser Phe Ser Asn Gln Glu Val 620 625 630	3544
tac atc gac cgc gtc gag ttc gtc cca gcc gag gtc acc ttc gag gcc Tyr Ile Asp Arg Val Glu Phe Val Pro Ala Glu Val Thr Phe Glu Ala 635 640 645	3592
gag tac gac ctg gag cgt gcc cag aag gcg gtg aac gcc ctg ttc acc Glu Tyr Asp Leu Glu Arg Ala Gln Lys Ala Val Asn Ala Leu Phe Thr 650 655 660	3640
tcc acc aac ccc agg cgc ctg aag acc gac gtc acg gac tac cac atc Ser Thr Asn Pro Arg Arg Leu Lys Thr Asp Val Thr Asp Tyr His Ile 665 670 675	3688
gac cag gtg tcc aac atg gtg gcc tgc ctc tcc gac gag ttc tgc ctg Asp Gln Val Ser Asn Met Val Ala Cys Leu Ser Asp Glu Phe Cys Leu 680 685 690 695	3736
gac gag aag cgc gag ctg ttc gag aag gtc aag tac gcg aag cgc ctc Asp Glu Lys Arg Glu Leu Phe Glu Lys Val Lys Tyr Ala Lys Arg Leu 700 705 710	3784
tcc gac gag cgc aac ctg ctc cag gac ccg aac ttc acc ttc atc tcc Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro Asn Phe Thr Phe Ile Ser 715 720 725	3832
ggc cag ctg tcc ttc gcg tcc atc gac ggc cag tcc aac ttc ccc tcc Gly Gln Leu Ser Phe Ala Ser Ile Asp Gly Gln Ser Asn Phe Pro Ser 730 735 740	3880
atc aac gag ctg tcc gag cac ggc tgg tgg ggc tcc gcg aac gtc acc Ile Asn Glu Leu Ser Glu His Gly Trp Trp Gly Ser Ala Asn Val Thr 745 750 755	3928
atc cag gag ggc aac gac gtc ttc aag gag aac tac gtc acc ctg ccg Ile Gln Glu Gly Asn Asp Val Phe Lys Glu Asn Tyr Val Thr Leu Pro 760 765 770 775	3976
ggc acc ttc aac gag tgc tac ccg aac tac ctc tac cag aag atc ggc Gly Thr Phe Asn Glu Cys Tyr Pro Asn Tyr Leu Tyr Gln Lys Ile Gly 780 785 790	4024
gag tcc gag ctg aag gcc tac acc cgc tac cag ctg cgc ggc tac atc Glu Ser Glu Leu Lys Ala Tyr Thr Arg Tyr Gln Leu Arg Gly Tyr Ile 795 800 805	4072

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gag gac tcc cag gac ctg gag atc tac ctc atc cgc tac aac gcg aag Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr Asn Ala Lys 810 815 820	4120
cac gag acc ctg gac gtc cct ggc acg gac tcc ctg tgg ccc ctc tcc His Glu Thr Leu Asp Val Pro Gly Thr Asp Ser Leu Trp Pro Leu Ser 825 830 835	4168
gtc gag tcg ccc atc ggc cgc tgc ggc gag ccc aac cgc tgc gct ccc Val Glu Ser Pro Ile Gly Arg Cys Gly Glu Pro Asn Arg Cys Ala Pro 840 845 850 855	4216
cac ttc gag tgg aac ccc gac ctg gac tgc tcc tgc cgc gac ggc gag His Phe Glu Trp Asn Pro Asp Leu Asp Cys Ser Cys Arg Asp Gly Glu 860 865 870	4264
cgc tgc gcg cac cat tcc cat cac ttc acc ctg gac atc gac gtc ggc Arg Cys Ala His His Ser His His Phe Thr Leu Asp Ile Asp Val Gly 875 880 885	4312
tgc acc gac ctg cac gag aac ctg ggc gtg tgg gtg gtc ttc aag atc Cys Thr Asp Leu His Glu Asn Leu Gly Val Trp Val Val Phe Lys Ile 890 895 900	4360
aag acg cag gag ggc tac gcc cgc ctg ggc aac ctg gag ttc atc gag Lys Thr Gln Glu Gly Tyr Ala Arg Leu Gly Asn Leu Glu Phe Ile Glu 905 910 915	4408
gag aag ccg ctg atc ggc gag gcg ctc tcc cgc gtc aag cgt gcg gag Glu Lys Pro Leu Ile Gly Glu Ala Leu Ser Arg Val Lys Arg Ala Glu 920 925 930 935	4456
aag aag tgg cgc gac aag cgc gag aag ctc cag ctg gag acc aag cgc Lys Lys Trp Arg Asp Lys Arg Glu Lys Leu Gln Leu Glu Thr Lys Arg 940 945 950	4504
gtc tac acc gag gcc aag gag gcc gtg gac gcc ctg ttc gtc gac tcc Val Tyr Thr Glu Ala Lys Glu Ala Val Asp Ala Leu Phe Val Asp Ser 955 960 965	4552
cag tac gac cag ctc cag gcg gac acc aac atc ggc atg atc cat gcg Gln Tyr Asp Gln Leu Gln Ala Asp Thr Asn Ile Gly Met Ile His Ala 970 975 980	4600
gct gac aag ctg gtc cac cgc atc cgc gag gcg tac ctg tcc gag ctg Ala Asp Lys Leu Val His Arg Ile Arg Glu Ala Tyr Leu Ser Glu Leu 985 990 995	4648
ccc gtc atc cct ggc gtc aac gcg gag atc ttc gag gag ctg gag Pro Val Ile Pro Gly Val Asn Ala Glu Ile Phe Glu Glu Leu Glu 1000 1005 1010	4693
ggc cac atc atc acc gcc atg tcc ctc tac gac gcg cgc aac gtg Gly His Ile Ile Thr Ala Met Ser Leu Tyr Asp Ala Arg Asn Val 1015 1020 1025	4738
gtc aag aac ggc gac ttc aac aac ggc ctg acg tgc tgg aac gtc Val Lys Asn Gly Asp Phe Asn Asn Gly Leu Thr Cys Trp Asn Val 1030 1035 1040	4783
aag ggc cac gtc gac gtc cag caa tcc cac cac cgc tcc gac ctg Lys Gly His Val Asp Val Gln Gln Ser His His Arg Ser Asp Leu 1045 1050 1055	4828
gtc atc ccc gag tgg gag gcc gag gtg tcc cag gcc gtc cgc gtc Val Ile Pro Glu Trp Glu Ala Glu Val Ser Gln Ala Val Arg Val 1060 1065 1070 1075	4873

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1060		1065		1070																
tgt	ccg	ggc	agg	ggc	tac	atc	ctg	cgc	gtc	acc	gcg	tac	aag	gag						4918
Cys	Pro	Gly	Arg	Gly	Tyr	Ile	Leu	Arg	Val	Thr	Ala	Tyr	Lys	Glu						
1075					1080					1085										
ggc	tac	ggc	gag	ggc	tgc	gtc	acg	atc	cac	gag	atc	gag	aac	aac						4963
Gly	Tyr	Gly	Glu	Gly	Cys	Val	Thr	Ile	His	Glu	Ile	Glu	Asn	Asn						
1090					1095					1100										
acc	gac	gag	ctg	aag	ttc	aag	aac	tgc	gag	gag	gag	gag	gtc	tac						5008
Thr	Asp	Glu	Leu	Lys	Phe	Lys	Asn	Cys	Glu	Glu	Glu	Glu	Val	Tyr						
1105					1110					1115										
ccg	acg	gac	acc	ggc	acg	tgc	aac	gac	tac	acc	gcg	cac	cag	ggc						5053
Pro	Thr	Asp	Thr	Gly	Thr	Cys	Asn	Asp	Tyr	Thr	Ala	His	Gln	Gly						
1120					1125					1130										
acc	gct	gcc	tgc	aac	tcc	cgc	aac	gct	ggc	tac	gag	gac	gcc	tac						5098
Thr	Ala	Ala	Cys	Asn	Ser	Arg	Asn	Ala	Gly	Tyr	Glu	Asp	Ala	Tyr						
1135					1140					1145										
gag	gtc	gac	acc	acc	gcc	tcc	gtc	aac	tac	aag	ccg	acc	tac	gag						5143
Glu	Val	Asp	Thr	Thr	Ala	Ser	Val	Asn	Tyr	Lys	Pro	Thr	Tyr	Glu						
1150					1155					1160										
gag	gag	acc	tac	acc	gac	gtc	cgt	cgc	gac	aac	cac	tgc	gag	tac						5188
Glu	Glu	Thr	Tyr	Thr	Asp	Val	Arg	Arg	Asp	Asn	His	Cys	Glu	Tyr						
1165					1170					1175										
gac	cgc	ggc	tac	gtg	aac	tac	cca	ccc	gtc	ccc	gct	ggc	tac	gtc						5233
Asp	Arg	Gly	Tyr	Val	Asn	Tyr	Pro	Pro	Val	Pro	Ala	Gly	Tyr	Val						
1180					1185					1190										
acg	aag	gag	ctg	gag	tac	ttc	ccc	gag	acc	gac	acc	gtc	tgg	atc						5278
Thr	Lys	Glu	Leu	Glu	Tyr	Phe	Pro	Glu	Thr	Asp	Thr	Val	Trp	Ile						
1195					1200					1205										
gag	atc	ggc	gag	acg	gag	ggc	aag	ttc	atc	gtc	gac	tcc	gtc	gag						5323
Glu	Ile	Gly	Glu	Thr	Glu	Gly	Lys	Phe	Ile	Val	Asp	Ser	Val	Glu						
1210					1215					1220										
ctg	ctc	ctg	atg	gag	gag	tgatagaatt	ctaaatctta	ttattatcat												5371
Leu	Leu	Leu	Met	Glu	Glu															
1225					1230															
cgtcgtcgtc	gtctcgtcac	ggaattaatt	aaagtaccta	ctccgtactt	agctagctac															5431
aataataagg	attcattgat	cactacaaga	gtgatcgact	cgactgtagt	atgtgtgtgc															5491
aatataatgt	gctgtctatc	aacaactact	agtattgtca	tttttttcga	accaggggaac															5551
tttttaatatga	taagaagaaa	aagacaagta	cttattgtcg	agcatgcgt																5600

<210> 14

<211> 1230

<212> PRT

<213> Artificial Sequence

<220>

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<223> fully synthetic expression cassette

<400> 14

Met Ala Thr Ser Asn Arg Lys Asn Glu Asn Glu Ile Ile Asn Ala Leu
 1 5 10 15

Ser Ile Pro Thr Val Ser Asn Pro Ser Thr Gln Met Asn Leu Ser Pro
 20 25 30

Asp Ala Arg Ile Glu Asp Ser Leu Cys Val Ala Glu Val Asn Asn Ile
 35 40 45

Asp Pro Phe Val Ser Ala Ser Thr Val Gln Thr Gly Ile Asn Ile Ala
 50 55 60

Gly Arg Ile Leu Gly Val Leu Gly Val Pro Phe Ala Gly Gln Leu Ala
 65 70 75 80

Ser Phe Tyr Ser Phe Leu Val Gly Glu Leu Trp Pro Ser Gly Arg Asp
 85 90 95

Pro Trp Glu Ile Phe Leu Glu His Val Glu Gln Leu Ile Arg Gln Gln
 100 105 110

Val Thr Glu Asn Thr Arg Asn Thr Ala Ile Ala Arg Leu Glu Gly Leu
 115 120 125

Gly Arg Gly Tyr Arg Ser Tyr Gln Gln Ala Leu Glu Thr Trp Leu Asp
 130 135 140

Asn Arg Asn Asp Ala Arg Ser Arg Ser Ile Ile Leu Glu Arg Tyr Val
 145 150 155 160

Ala Leu Glu Leu Asp Ile Thr Thr Ala Ile Pro Leu Phe Arg Ile Arg
 165 170 175

Asn Glu Glu Val Pro Leu Leu Met Val Tyr Ala Gln Ala Ala Asn Leu
 180 185 190

His Leu Leu Leu Arg Asp Ala Ser Leu Phe Gly Ser Glu Trp Gly
 195 200 205

Met Ala Ser Ser Asp Val Asn Gln Tyr Tyr Gln Glu Gln Ile Arg Tyr
 210 215 220

Thr Glu Glu Tyr Ser Asn His Cys Val Gln Trp Tyr Asn Thr Gly Leu
 225 230 235 240

Asn Asn Leu Arg Gly Thr Asn Ala Glu Ser Trp Leu Arg Tyr Asn Gln
 245 250 255

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Phe Arg Arg Asp Leu Thr Leu Gly Val Leu Asp Leu Val Ala Leu Phe
 260 265 270
 Pro Ser Tyr Asp Thr Arg Thr Tyr Pro Ile Asn Thr Ser Ala Gln Leu
 275 280 285
 Thr Arg Glu Ile Tyr Thr Asp Pro Ile Gly Arg Thr Asn Ala Pro Ser
 290 295 300
 Gly Phe Ala Ser Thr Asn Trp Phe Asn Asn Asn Ala Pro Ser Phe Ser
 305 310 315 320
 Ala Ile Glu Ala Ala Ile Phe Arg Pro Pro His Leu Leu Asp Phe Pro
 325 330 335
 Glu Gln Leu Thr Ile Tyr Ser Ala Ser Ser Arg Trp Ser Ser Thr Gln
 340 345 350
 His Met Asn Tyr Trp Val Gly His Arg Leu Asn Phe Arg Pro Ile Gly
 355 360 365
 Gly Thr Leu Asn Thr Ser Thr Gln Gly Leu Thr Asn Asn Thr Ser Ile
 370 375 380
 Asn Pro Val Thr Leu Gln Phe Thr Ser Arg Asp Val Tyr Arg Thr Glu
 385 390 395 400
 Ser Asn Ala Gly Thr Asn Ile Leu Phe Thr Thr Pro Val Asn Gly Val
 405 410 415
 Pro Trp Ala Arg Phe Asn Phe Ile Asn Pro Gln Asn Ile Tyr Glu Arg
 420 425 430
 Gly Ala Thr Thr Tyr Ser Gln Pro Tyr Gln Gly Val Gly Ile Gln Leu
 435 440 445
 Phe Asp Ser Glu Thr Glu Leu Pro Pro Glu Thr Thr Glu Arg Pro Asn
 450 455 460
 Tyr Glu Ser Tyr Ser His Arg Leu Ser His Ile Gly Leu Ile Ile Gly
 465 470 475 480
 Asn Thr Leu Arg Ala Pro Val Tyr Ser Trp Thr His Arg Ser Ala Asp
 485 490 495
 Arg Thr Asn Thr Ile Gly Pro Asn Arg Ile Thr Gln Ile Pro Leu Val
 500 505 510
 Lys Ala Leu Asn Leu His Ser Gly Val Thr Val Val Gly Gly Pro Gly
 515 520 525

Paper Copy Sequence Listing 15414A_v4.ST25.txt

Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr Asn Thr Gly Thr Phe Gly
 530 535 540
 Asp Ile Arg Leu Asn Ile Asn Val Pro Leu Ser Gln Arg Tyr Arg Val
 545 550 555 560
 Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu Gln Phe Phe Thr Arg Ile
 565 570 575
 Asn Gly Thr Thr Val Asn Ile Gly Asn Phe Ser Arg Thr Met Asn Arg
 580 585 590
 Gly Asp Asn Leu Glu Tyr Arg Ser Phe Arg Thr Ala Gly Phe Ser Thr
 595 600 605
 Pro Phe Asn Phe Leu Asn Ala Gln Ser Thr Phe Thr Leu Gly Ala Gln
 610 615 620
 Ser Phe Ser Asn Gln Glu Val Tyr Ile Asp Arg Val Glu Phe Val Pro
 625 630 635 640
 Ala Glu Val Thr Phe Glu Ala Glu Tyr Asp Leu Glu Arg Ala Gln Lys
 645 650 655
 Ala Val Asn Ala Leu Phe Thr Ser Thr Asn Pro Arg Arg Leu Lys Thr
 660 665 670
 Asp Val Thr Asp Tyr His Ile Asp Gln Val Ser Asn Met Val Ala Cys
 675 680 685
 Leu Ser Asp Glu Phe Cys Leu Asp Glu Lys Arg Glu Leu Phe Glu Lys
 690 695 700
 Val Lys Tyr Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp
 705 710 715 720
 Pro Asn Phe Thr Phe Ile Ser Gly Gln Leu Ser Phe Ala Ser Ile Asp
 725 730 735
 Gly Gln Ser Asn Phe Pro Ser Ile Asn Glu Leu Ser Glu His Gly Trp
 740 745 750
 Trp Gly Ser Ala Asn Val Thr Ile Gln Glu Gly Asn Asp Val Phe Lys
 755 760 765
 Glu Asn Tyr Val Thr Leu Pro Gly Thr Phe Asn Glu Cys Tyr Pro Asn
 770 775 780
 Tyr Leu Tyr Gln Lys Ile Gly Glu Ser Glu Leu Lys Ala Tyr Thr Arg

785 Paper Copy Sequence Listing 15414A_v4.ST25.txt
 790 795 800
 Tyr Gln Leu Arg Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr
 805 810 815
 Leu Ile Arg Tyr Asn Ala Lys His Glu Thr Leu Asp Val Pro Gly Thr
 820 825 830
 Asp Ser Leu Trp Pro Leu Ser Val Glu Ser Pro Ile Gly Arg Cys Gly
 835 840 845
 Glu Pro Asn Arg Cys Ala Pro His Phe Glu Trp Asn Pro Asp Leu Asp
 850 855 860
 Cys Ser Cys Arg Asp Gly Glu Arg Cys Ala His His Ser His His Phe
 865 870 875 880
 Thr Leu Asp Ile Asp Val Gly Cys Thr Asp Leu His Glu Asn Leu Gly
 885 890 895
 Val Trp Val Val Phe Lys Ile Lys Thr Gln Glu Gly Tyr Ala Arg Leu
 900 905 910
 Gly Asn Leu Glu Phe Ile Glu Glu Lys Pro Leu Ile Gly Glu Ala Leu
 915 920 925
 Ser Arg Val Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Lys
 930 935 940
 Leu Gln Leu Glu Thr Lys Arg Val Tyr Thr Glu Ala Lys Glu Ala Val
 945 950 955 960
 Asp Ala Leu Phe Val Asp Ser Gln Tyr Asp Gln Leu Gln Ala Asp Thr
 965 970 975
 Asn Ile Gly Met Ile His Ala Ala Asp Lys Leu Val His Arg Ile Arg
 980 985 990
 Glu Ala Tyr Leu Ser Glu Leu Pro Val Ile Pro Gly Val Asn Ala Glu
 995 1000 1005
 Ile Phe Glu Glu Leu Glu Gly His Ile Ile Thr Ala Met Ser Leu
 1010 1015 1020
 Tyr Asp Ala Arg Asn Val Val Lys Asn Gly Asp Phe Asn Asn Gly
 1025 1030 1035
 Leu Thr Cys Trp Asn Val Lys Gly His Val Asp Val Gln Gln Ser
 1040 1045 1050

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His	His	Arg	Ser	Asp	Leu	Val	Ile	Pro	Glu	Trp	Glu	Ala	Glu	Val
	1055					1060					1065			
Ser	Gln	Ala	Val	Arg	Val	Cys	Pro	Gly	Arg	Gly	Tyr	Ile	Leu	Arg
	1070					1075					1080			
Val	Thr	Ala	Tyr	Lys	Glu	Gly	Tyr	Gly	Glu	Gly	Cys	Val	Thr	Ile
	1085					1090					1095			
His	Glu	Ile	Glu	Asn	Asn	Thr	Asp	Glu	Leu	Lys	Phe	Lys	Asn	Cys
	1100					1105					1110			
Glu	Glu	Glu	Glu	Val	Tyr	Pro	Thr	Asp	Thr	Gly	Thr	Cys	Asn	Asp
	1115					1120					1125			
Tyr	Thr	Ala	His	Gln	Gly	Thr	Ala	Ala	Cys	Asn	Ser	Arg	Asn	Ala
	1130					1135					1140			
Gly	Tyr	Glu	Asp	Ala	Tyr	Glu	Val	Asp	Thr	Thr	Ala	Ser	Val	Asn
	1145					1150					1155			
Tyr	Lys	Pro	Thr	Tyr	Glu	Glu	Glu	Thr	Tyr	Thr	Asp	Val	Arg	Arg
	1160					1165					1170			
Asp	Asn	His	Cys	Glu	Tyr	Asp	Arg	Gly	Tyr	Val	Asn	Tyr	Pro	Pro
	1175					1180					1185			
Val	Pro	Ala	Gly	Tyr	Val	Thr	Lys	Glu	Leu	Glu	Tyr	Phe	Pro	Glu
	1190					1195					1200			
Thr	Asp	Thr	Val	Trp	Ile	Glu	Ile	Gly	Glu	Thr	Glu	Gly	Lys	Phe
	1205					1210					1215			
Ile	Val	Asp	Ser	Val	Glu	Leu	Leu	Leu	Met	Glu	Glu			
	1220					1225					1230			